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CENTRAL & SOUTH AMERICA

VOL. I.

SOUTH AMERICA

A. H. KEANE, LL.D.

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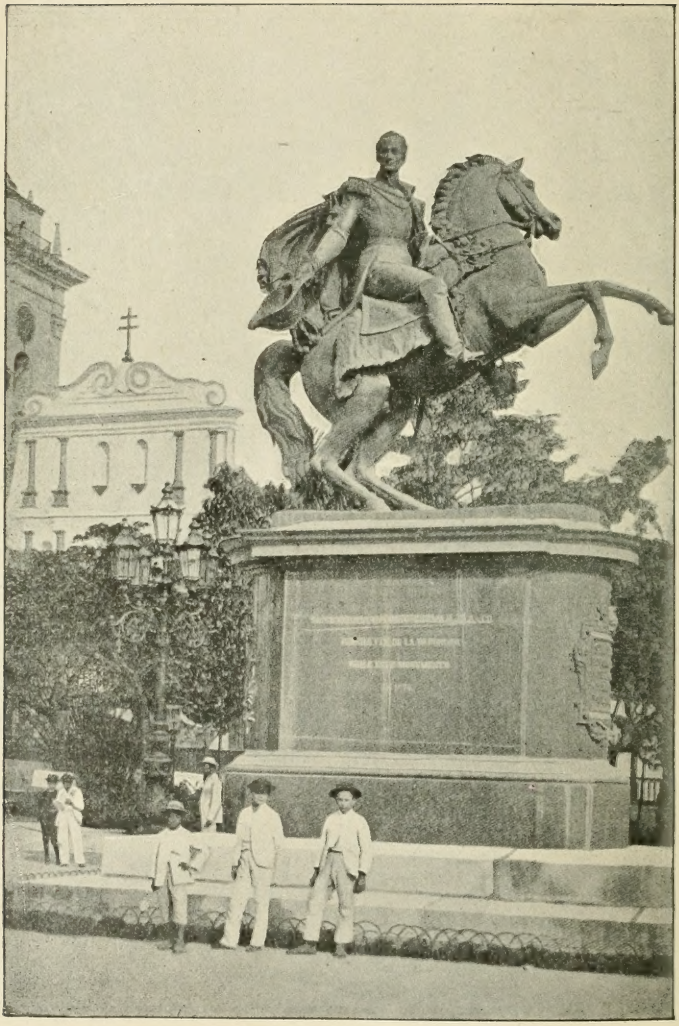
GEOGRAPHY AND TRAVEL

(NEW ISSUE)



STATUE OF BOLIVAR : CARACAS.

STANFORD'S

COMPENDIUM OF GEOGRAPHY AND TRAVEL

(NEW ISSUE)

CENTRAL

AND

SOUTH AMERICA

VOL. I

BY

A. H. KEANE, LL.D., F.R.G.S.

AUTHOR OF 'ASIA' AND 'AFRICA' IN SAME SERIES; 'EASTERN GEOGRAPHY'; 'THE BOER STATES'; 'ETHNOLOGY'; 'MAN PAST AND PRESENT'; 'THE GOLD OF OPHIR'; 'THE WORLD'S PEOPLES'; ETC., ETC.

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PRESIDENT OF THE ROYAL GEOGRAPHICAL AND HAKLUYT SOCIETIES

SECOND EDITION, REVISED

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MAPS AND ILLUSTRATIONS

LONDON: EDWARD STANFORD

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PREFACE TO THE SECOND EDITION

It is often assumed that geographical research has completed its work in South America, where "little more remains to be discovered." It would be nearer the truth to say that this Austral continent still presents probably a more ample, and certainly a more arduous field of exploration than any other region on the globe. Elsewhere the obstacles that have to be surmounted, and have already been largely overcome, are mainly vast sandy wastes, arid, treeless, steppe lands, or lofty waterless plateaux, as in Tibet, Central Asia, North Africa, and Australia. Here the barriers to progress are, on the contrary, superabundant moisture and tropical heats, fostering sunless and trackless woodlands, which, owing to their prodigious extent, offer well-nigh insuperable difficulties to the most enterprising explorers. Hence it is that the densely-wooded regions of the Amazonian lands and of the eastern slopes of the Cordilleras that have never yet been visited, or at most traversed here and there by a few daring pioneers, still cover many hundred thousand square miles.

Nevertheless, the work that has been accomplished during the eight years since the first issue of this work, and is here duly recorded, is sufficient to show that steady progress is being made in the efforts to reduce the area of the still untrodden regions. By a happy combination of geographical and engineering enterprise, Mr. C. R. Enock has carried out extensive surveys in the Peruvian Montaña, and crowned his achievements by ascending the rugged Huascan heights for the first time in 1904. Under the stimulating action of the Peruvian "Committee of Fluvial Highways," the district about the Tambopata and Inambari tributaries of the Madre de Dios was traversed by S. Maldonado and others in 1902, while the rich Canpolican province in the Upper Beni basin was opened up by Dr. J. W. Evans in 1901-2. Thus a large part of the hitherto little known Yungas region along the eastern slopes of Peru and Bolivia was made accessible to commercial enterprise and settlement. In Ecuador remeasurements of the meridian arc were carried out in the years 1900-06 with more definite results than before, and about the same time Dr. Hans Meyer ascended Chimborazo, and found that the glaciers of the Ecuador highlands were formerly far more extensive than at present. Anthropologists will be interested to know that during his descent of the Napo river from Ecuador to the plains Mr. A. H. Rice interviewed in 1901 a hitherto unknown tribe of dwarfs in the Papal-

lacta district, who presented the further peculiarity that the femur, instead of being the longest bone in the body, was shorter than the tibia, as amongst the Bolivian Aymaras. In Bolivia the extensive Titicaca-Aullagas lacustrine basin, by far the largest in South America, was again thoroughly surveyed in 1903 by Dr. Neveu-Lemaire, who found no evidence to show that this great reservoir at any time sent its overflow to the Amazons.

Amongst the great rivers partly resurveyed it will suffice here to mention—(1) the Orinoco, which was navigated in a canoe by S. P. Triana in 1902; (2) the northern Rio Negro, whose Uaupes tributary was for the first time ascended in 1904 by Dr. T. Koch to its Cuduiary headstream; (3) the Pilcomayo, the lower course of which was surveyed in 1906-07 by the brothers Schmied, while its middle course was reached by W. Herrmann in 1907; (4) the Uruguay officially surveyed as far as Concordia in 1905.

Of political events there is nothing to record except the numerous rectifications of frontiers, all noticed in their place; the separation of Panama from Colombia in 1903; and the disappearance of President Castro from Venezuela in 1908, after a turbulent and aggressive rule of some years. With this exception the whole continent has continued to make steady material progress, as indicated by yearly-increasing pacific international relations, and by the remarkable development

of railway enterprise, especially in Brazil, Argentina, Bolivia, and Peru.

Attention may here be called to a few works of special importance in which are embodied many particulars regarding the geographical features, the archæology, botany, and zoology of the several republics. Such are: K. Reiches' *Pflanzenverbreitung in Chile* (1907); Scott Elliot's paper on the same subject in the *Geographical Journal* for May 1906; W. Vallentin's *Paraguay: das Land der Guaranis* (1907); Sir T. Holdich, *The Countries of the King's Award* (1904); P. E. Martin, *Through Five Republics* (1905).

A. H. KEANE.

79 Broadhurst Gardens, N.W.,
March 1909.

PREFACE TO THE FIRST EDITION

In the new issue of this series the single volume originally devoted to Central America, the West Indies, and South America is replaced by two, each somewhat larger than their predecessor. The very ample additional space thus secured has been found no more than sufficient to embody the more important results of the numerous scientific expeditions made to almost every part of Latin America during the last two decades by Whymper, Conway, Fitzgerald, Crevaux, Thouar, im Thurn, Rodway, Ehrenreich, von den Steinen, Reiss, Church, Stübel, Ball, Brigham, Hill, Romero, Thompson, Seler, and many other distinguished geographers, archæologists, naturalists, and anthropologists. Many of the discoveries were of a fundamental character, profoundly modifying the views hitherto prevailing on such questions as the tectonic constitution, both of Central and South America, the West Indian orographic systems, the distribution of plants and animals over the whole area, the cradle and primitive migrations of Caribs and Arawaks; the ethnical relations of Toltecs, Aztecs, and Mayas, of

Quichuas (Peruvians) and Aymaras (Bolivians), the origin of the marvellous Tiahuanaco monuments, and of other remains of native American culture. Attention has also been claimed by the recent political changes in the West Indies, by frontier questions, as between British Guiana and Venezuela, and between Chile and Argentina, by inter-oceanic ship-canal projects, by transcontinental railway schemes, and by the altered economic conditions, especially in Mexico, Chile, Brazil, and Argentina. All these transformations called for adequate treatment, if only to show that in the New World, material and moral progress is no longer confined to "Anglo-Saxon America," and that henceforth the Hispano-Lusitanian commonwealths enter into the comity of the other cultured nations on a footing of absolute equality and independence.

In distributing the subject matter over these two volumes, it has been found convenient to deviate somewhat from the usual arrangement. Thus the European colonies in South America—British, Dutch, and French Guiana—have been transferred to the volume on Central America and the West Indies, with which they have always been popularly associated as well as intimately connected in their history, traditions, commercial and ethnical relations. The arrangement has the further advantage of giving a distinct unity to the present volume, to which is reserved the whole of the South American continent, so far as it

forms a political domain complete in itself, and independent of all Foreign Powers.

The publisher is indebted to Dr. F. P. Moreno for the use of some of his excellent photographs of Argentina and Patagonia; to Sir Martin Conway for the illustrations of Illimani; to Mr. F. A. A. Simons for those in the chapters on Colombia; and to Mr. Pilditch of the Puerto Cabello and Valencia Railway Company for those relating to Venezuela. Mr. Whymper has kindly consented to the reproduction of the view of Chimborazo and Cotopaxi from his *Travels amongst the Great Andes of the Equator*, and the view of Aconcagua is taken by permission from Mr. Fitzgerald's *The Highest Andes*. The photographs of Rio de Janeiro are from Messrs. Spooner's Series, and a number of other coast towns have been illustrated from photographs by Mr. Boote of Buenos Ayres.

A. H. KEANE.

October, 1900.

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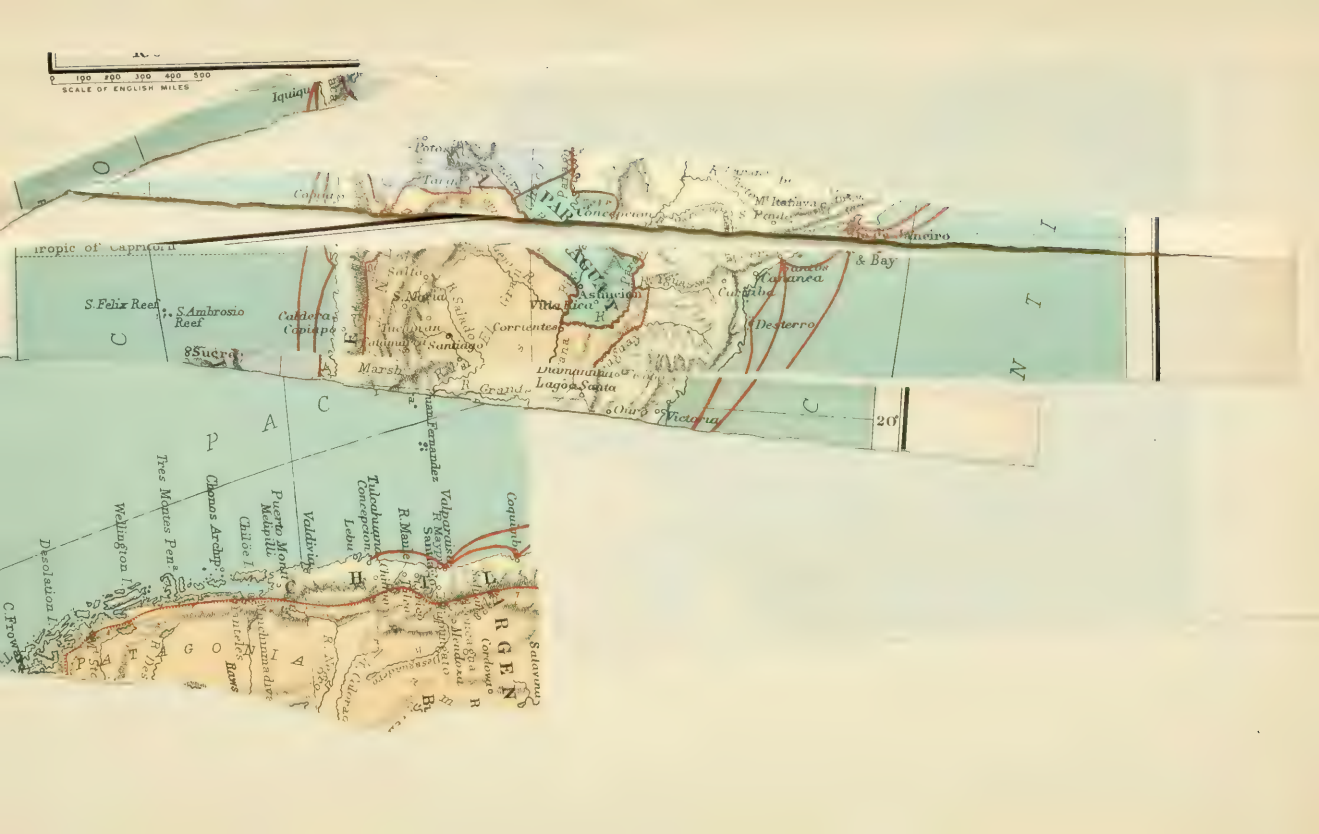
SCALE OF ENGLISH MILES
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Iquique
Copiapo
Tropic of Capricorn
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S. Ambrosio Reef
Caldera
Copiapo
Sucre
Marsh
Grand
Juan Fernandez
Tres Montes Pen.
Chonos Archip.
Wellington I.
Desolation I.
C. Froward
Puerto Montt
Melipilli
Valdivia
Chiloe I.
Tolcahuano
Concepcion
Lebu
R. Maule
Valparaiso
Santiago
Coquimbo
Huasco
Copiapo
Salto
S. Maria
Villa Rica
Asuncion
Corrientes
Santiago
Lagoa Santa
Ouro
Victoria
Rio Janeiro
Cabo Frio
Victoria
Desterro
Maldonado
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Corrientes
Salto
Concepcion
Talcahuano
Lebu
Valparaiso
Santiago
Coquimbo
Huasco
Copiapo
Iquique
Tarapaca
Arica
Cobija
Mollendo
Islay
Arequipa
Puno
Titicaca
Cuzco
Lima
Callao
Truxillo
Payta
Guayaquil
Panama
Chagres
Porto Bello
Carthagena
Maracaibo
Laguayra
Puerto Cabello
Coro
Barquisimeto
Valencia
Caracas
Cumana
Trinidad
Barbadoes
Tobago
St. Vincent
Martinique
Guadaloupe
Antigua
St. Thomas
Porto Rico
Jamaica
Cape Tiburon
Cape Antonio
Havana
Matanzas
Key West
Tampa Bay
Charleston
Cape Hatteras
Cape Henry
Delaware Bay
Cape May
Sandy Hook
New York
Long Island
Block Island
Nantucket
Cape Cod
Boston
Portland
Halifax
Cape Race
Cape Ray
Cape Breton
Prince Edward I.
Anticosti
Gaspe
Quebec
Montreal
Kingston
Toronto
Niagara
Detroit
Lake Erie
Lake Ontario
Lake Huron
Lake Michigan
Lake Superior
Lake Winnipeg
Lake Athabasca
Great Slave Lake
Great Bear Lake
Mackenzie R.
Fort Simpson
Fort Norman
Fort Good Hope
Fort Yukon
Fort Selkirk
Fort Simpson
Fort Wrangel
Sitka
Queen Charlotte I.
Vancouver I.
Nootka Sd.
Juan de Fuca Str.
Columbia R.
Fort Vancouver
Astoria
Fort Hall
Fort Boise
Fort Walla Walla
Fort Colville
Fort Kootenay
Fort Edmonton
Fort Assiniboine
Fort Carlton
Fort Pelly
Fort Ellice
Fort Garry
Fort Alexander
Fort Churchill
Fort Severn
Fort Albany
Moose Factory
Fort Rupert
Fort Nelson
Fort Liard

SOUTH AMERICA

CHAPTER I

GENERAL SURVEY—PHYSICAL AND BIOLOGICAL RELATIONS

North and South America: Analogies and Contrasts—Physical and Climatic Contrasts—Seaboard—Fjords—Islands—Climate of South America—Relief of the Land—The Inland Seas—Central Plains—The Great Fluvial Basins—Orography—The Andes—The Brazilian Uplands—Subsidence and Upheaval—Flora—Fauna—The South American Neogæic Realm.

North and South America: Analogies and Contrasts.

Between the "twin continents," as the northern and southern sections of the New World have been called, the transitions are everywhere so gradual that it is not at first sight easy to say where one ends and the other begins. But when the question is studied on a large-scale map, we see at once that the true natural limits are laid down, at the north-west extremity of the southern section, by the Gulf of Darien (Oraba), which formerly penetrated much farther inland than at present, and probably formed a free waterway between the Atlantic and Pacific Oceans. The course of such a channel, which many engineers believe might be easily restored by the

construction of an international ship-canal offering far greater facilities than any of the alternative schemes hitherto proposed, is clearly indicated by the trend of the Atrato and S. Juan river valleys.

The joint fluvial axis of these streams, which are separated only by a low ridge only 361 feet high and much nearer to the western than to the eastern ocean, runs from the Caribbean Sea, where the Atrato debouches, nearly due south to the mouth of the S. Juan below Bonaventura, on the Pacific coast. While thus cutting off the Andean system at this point from the Central American Cordilleras, the two river valleys, which have a total length of nearly 500 miles, constitute at the same time the most natural parting-line between the two divisions of the New World.

So obvious are the points of resemblance between these divisions that they strike the eye at the first glance. Both present the same rough triangular shape, with base inclined from north-west to south-east, and sides of nearly equal length converging to the apex southwards. In superficial extent there is little difference, the northern triangle scarcely exceeding the southern by one-eighth, while a surprising parallelism is presented by the general relief, the disposition of mountain ranges, tablelands, plains, and fluvial basins. Thus to the Rocky Mountains and Central Sierras correspond the Andean Cordilleras, both running close to the west coast, and ramifying at intervals into two or even three branches, which enclose vast plateaux often of great elevation. Indeed, the resemblances are here so striking, and extend to so many secondary features, such as active and extinct volcanoes with extensive lava-fields and other igneous matter overlying sedimentary formations, that the unity of the orographic system from Fuegia to Alaska, first suggested

by Humboldt, was long accepted by geographers without demur.

On the Atlantic side the correspondence is maintained by the Alleghanies in the north, and in the south by the Sierra de Mar, the Guiana, and the Brazilian highlands. In both regions the western and eastern mountain systems enclose boundless central plains—prairies, savannahs, llanos, pampas, woodlands—which are traversed in much the same directions by a few fluvial arteries, rivalling or surpassing in volume, length, and drainage area the great rivers of the eastern hemisphere. With two important exceptions—Mackenzie and Yukon—the outfall is to the Atlantic, recipient also of so many running waters on its eastern seaboard. Thus the Churchill, St. Lawrence and Hudson trending east, and the Missouri-Mississippi with a southerly course, find their exact counterparts in the Orinoco and Amazon on the one hand and the Parana-Paraguay on the other.

Physical and Climatic Contrasts

But these analogies, which lie somewhat on the surface, are perhaps more than balanced by the contrasts, which are in some respects of greater moment, and on the whole more favourable to the north than to the south. Foremost amongst these is the position in respect of the poles and the equator. Here the discrepancy is enormous, sufficient in fact to constitute the southern division mainly a tropical, the northern mainly a temperate region. To be sure, much of North America seems to lie within the Arctic Circle, or near enough to be called Arctic. But the absolute area of this section, consisting so largely of archipelagos with extensive intervening water-surfaces, is less than is commonly supposed, and is amply compen-

sated by the bulging out and consequent great average breadth of the continent in more favourable latitudes.

But the very opposite is the case in South America, where the bulging takes place about the equator, with a consequent excess of heat and moisture, and where, beyond the Tropic of Capricorn, the land tapers so rapidly southwards that but a relatively small area is extra-tropical. Hence only a fraction of the southern continent would be suitable for European settlement were the tropical heats not tempered by the great elevation of the Brazilian and Andean uplands, and by the moderating influence of sea breezes from the Atlantic. Owing to these favourable conditions the general climate of South America is more equable and cooler by several degrees than that of the African continent. Thus the isothermal line of greatest heat, which runs from the isthmus of Panama mainly along the seaboard to Cape São Roque, intersecting the equator at the Amazon estuary, ranges from about 80° to 82° F., while the temperature of the corresponding heat zone on the east side of the Atlantic normally exceeds 86° F.

Other important consequences, also to the advantage of the north, follow from this general latitudinal position of the twin continents. During the glacial epochs, whether simultaneous or not on either side of the equator, a fairly warm temperature must have at all times prevailed in inter-tropical South America, with the result that the running waters suffered no serious arrest, but continued their natural process of development without interruption except in the sub-arctic lands of the extreme south.

Hence on the Chilean coast and in Fuegia alone are found those peculiar fjord-like formations which, as in Scandinavia and Greenland, are due to the grinding action

of glaciers or frozen streams. Elsewhere the rivers have excavated their beds down to their natural levels, and in so doing have drained nearly all the old lacustrine basins and effaced most of the falls and rapids which formerly abounded in many districts. Cataracts still survive in the Colombian and Peruvian Andes, on the Parana, the Madeira and elsewhere; but all the large lakes have disappeared except Titicaca and the still periodically flooded Mojos basin about the Amazon-Parana water-parting, at the northern extremity of the old Pampean Sea.

Even Titicaca, though still an imposing sheet of water, is little more than a highland loch compared to its vast dimensions in Secondary and Tertiary times. "Geological examinations show that Titicaca was once one of the large lakes of the world, and that it has slowly been drying up."[1]

How different from all this the picture presented by the northern continent, where glacial action attained a greater development than in any other part of the world, where the ice-cap, thousands of feet thick, advanced and retreated more than once over vast areas millions of miles in extent, and where icebergs in great numbers are still annually discharged from the Greenland and Alaskan glaciers. Hence the mighty streams held in their icy fetters till far into the Pleistocene age have not since had time to arrive at maturity. They still tumble over some of the grandest falls on the globe, and have left undrained the great lakes of the Laurentian basin and many others strewn over the Canadian Dominion, while the seaboard is so finely diversified with fjords, gulfs, bays, and other inlets that it presents 26,000 miles of contour-lines compared with the 22,200 miles of the somewhat monotonous South American coastlands. Even this

[1] Col. G. E. Church, *Geogr. Jour.* (Oct. 1898), p. 401.

might seem a liberal allowance until we find that Europe, for instance, with little more than half the area, can show a seaboard of no less than 16,000 miles, including all the windings of the coasts.

Seaboard—Fjords—Islands

Practically the South American coasts, always excepting Chile, Patagonia, and Fuegia, have no windings or inlets beyond the relatively insignificant Gulfs of Darien and Venezuela in the north and Guayaquil on the west, with the still smaller bays of Rio de Janeiro and Bahia on the east side. The few other indentations are not marine inlets, but great fluvial estuaries, which by the deposits of silt are being slowly transformed to deltas like that of the Orinoco, or else converted into alluvial plains like that of the Rio Colorado. Formerly the lower reaches of this Pampean stream presented the aspect of a very large estuary running over 100 miles inland, though still greatly inferior to those of the Plate and Amazon, which are amongst the most typical and extensive of such formations in the world.

There is also a remarkable absence of islands or insular groups, South America showing in this respect a close analogy with the two other great Austral lands. As South Africa has its Madagascar and Southern Australia its Tasmania, so our continent terminates southwards in Tierra del Fuego. The few insular groups in the Caribbean Sea should either be grouped with the West Indian system (Leeward Chain) or else regarded as almost still forming part of the mainland (Trinidad, Tobago). In even closer connection with the mainland are Chiloe, the Chonos Archipelago, Wellington, and the other islands which fringe the Chilean seaboard and merge south-eastwards in the

Fuegian group. In order to discover any other insular formations that may fairly be regarded as geographical dependencies of South America, the gaze must sweep the eastern horizon to the British groups of the Falklands and Georgia in the Austral seas, and farther north to another Trinidad and Fernando Noronha, mere specks lost in the Atlantic waters, but jealously guarded by the Brazilian State.

Turning westwards, we shall with difficulty detect the Malpelo and Cocos rocks claimed by Colombia, while attention will be arrested by the relatively large Galapagos cluster, which, being cut by the equator, belongs politically to Ecuador, but, owing to the exceptional interest of its fauna and flora, is the common property of all naturalists. Still farther south the S. Feliz and S. Ambrosio reefs lead along the same meridian (80° W.) to the islets of Mas a Fuera and Juan Fernandez, the latter for ever associated with De Foe's immortal hero, friend of young and old alike. All these groups, lying between 25°–35° S. lat., are Chilean dependencies.

Subjoined are tabulated some of the leading points of the twin continents :—

	North America.	South America.
Superficial area . . .	7,833,000 sq. m.	6,896,000 sq. m.
Extreme length . . .	4,600 miles.	4,500 miles
Coast-line	26,000 ,,	22,200 ,,
Greatest distance from centre to coast	1,800 ,,	1,700 ,,
Culminating point . .	18,100 feet (Mt. St. Elias)	23,080 feet[1] (Aconcagua)
Greatest river drainage area .	1,767,000 sq. m. (Mississippi-Missouri)	2,722,000 sq. m. (Amazon)

[1] Fitzgerald's estimate, but reduced to 22,830 ft. by Luis Patron (1903), and to 22,812 by Fr. Schrader (1904).

Climate of South America

It is often stated, and indeed assumed, that the climate of the western is considerably colder than that of the eastern hemisphere. But the assumption has to be taken with great reserve. In fact it cannot be accepted as a whole, and while perfectly true of North America, this somewhat hasty generalisation breaks down completely when applied to the southern division. The mean temperature of insular regions, and physically as well as in other respects America is an island, is largely determined by the surrounding waters, more so perhaps than by the general relief of the land wherever the altitude is not excessive. Now South America is washed by two great marine currents—the warm Atlantic stream on the east side, and the cold Antarctic wave on the Pacific side—and these are normally accompanied by corresponding aërial currents. Under ordinary conditions such opposites might be expected to neutralise each other, or establish a general equilibrium. But not so in this continent, where the effects of the western cold winds and waters are intercepted and confined to a narrow strip of coastlands by the Andes, pierced only in South Patagonia by rivers and sounds, whereas on the east side the warm marine and atmospheric currents have much freer scope, thanks partly to the lower elevation of the Brazilian uplands, and also to the great fluvial valleys, through which, as through open gates, the tepid Atlantic breezes find easy access to the very foot of the Cordilleras.

Thus it happens that a kind of diagonal climatic relation is set up between the twin continents. To the narrow Pacific seaboard of South America corresponds the broad Atlantic seaboard in the north, with this differ-

ence, that here it is the cold winds and waters that have full and almost unimpeded play right across the central regions to the foot of the Rocky Mountains. Similarly, the conditions on the South American Atlantic coastlands are repeated on the North American Pacific coastlands, where prevail the warm equatorial currents, and where also their range is limited by the great elevation of the Sierras and Rockies. Thus is explained the curious phenomenon that the mean temperature of North America is lower by perhaps 20° F., and that of South America higher than, or at least equal to, that of the Afro-European regions.

Why then, it may be asked, is Central Patagonia so bleak and arid? The answer is, partly because the high latitude here tells, and also because here the cold Austral winds sweep over the plains east of the Andes unimpeded by any obstacle till they reach the Tandil and Ventana heights between the Colorado basin and the Plate estuary. Moreover, if very cold in winter, Patagonia is very hot in summer, which may in some measure be explained on the cosmic ground that in the southern hemisphere summer occurs when the earth is nearest, and winter when it is farthest, from the sun. But from this it is not to be inferred that, as commonly supposed, the southern has as a whole a lower mean temperature than the northern hemisphere. On the contrary, there are good reasons for believing, with the late Professor John Ball, "that the southern hemisphere is not colder than the northern, and that all arguments based upon an opposite assumption must be set aside." [1]

[1] *Notes of a Naturalist in South America*, p. 275.

Relief of the Land—The Inland Seas

No less simple than its contour-lines is the general framework of the southern continent, which seems to have undergone more than one transformation since Secondary times. At first it may be conceived as an archipelago, or at least a group of three or four slightly connected huge masses much more elevated in the east than in the west, and now represented chiefly by the greatly denuded Brazilian highlands on the Atlantic, and the, at that time, very much lower Andean chain on the Pacific side, the latter prolonged eastwards by the transverse Sierra de Merida with its eastern extension facing the Caribbean Sea, the former prolonged westwards by the Central Brazilian uplands. In the south the Ventana and Tandil heights projected eastwards to the Atlantic without cutting off the old Colorado basin from the great inland sea, which probably flowed from the northern foot of the Patagonian plateau continuously northwards between the Andean and Brazilian uplands to the southern slopes of the Sierra de Merida. This great "Mediterranean," however, must have been contracted to relatively narrow sounds or channels at three points—in the south between the Andean and Ventana uplands, farther north between the Central Brazilian and Bolivian Cordilleras, and again between the Venezuelan and Colombian highlands.

Then, as the Andean system gradually rose higher and higher, while the Brazilian was lowered by subsidence and a prodigious extent of denudation, the inland waters, amid which the Ventana, Cordova, and other smaller masses stood out like islands, were broken into three secondary basins by the closing of the narrows at the

points above indicated. The two northern seas would appear to have been somewhat rapidly transformed—partly by the abundant sedimentary deposits washed down from the encircling hills, partly also perhaps by upheaval—to the fluvial valleys which now constitute the Orinoco and Amazon systems.

But the southern basin, rediscovered, so to say, and aptly named the Pampean Sea by Colonel Church,[1] seems to have persisted longer. Under the twofold specified influence this marine inlet became detached first from its northern section, the scarcely yet obliterated Lake Mojos, and was then in due course transformed to the boundless diluvial and alluvial valley now traversed in all directions by the ramifications of the Parana-Paraguay river system.

Thus were slowly welded together the wholly or partly detached masses of former ages, and, that such may well have been the geological record of the continent thus created, is made highly probable by its present constitution, and especially by the extraordinary simplicity of its hydrographic and orographic outlines. How else explain, for instance, the still surviving intercommunications of all these great river systems, interlaced not at their mouths, as we see in the common Brahmaputra-Ganges delta, but in their upper reaches, where the Orinoco is linked by the Cassiquiare with the Amazon, and the Amazon with the Parana by an intricate network of channels and backwaters flowing now one way, now another. Here the slopes of the divide are so gently inclined that a mere snag or a slight landslip suffices to divert the currents from one basin to the other. "Owing to their horizontality, all the plains from the mouth of the Mamoré to the Pilcomayo" (that

[1] *Geogr. Jour.*, October 1898.

is right across the main Amazon-Parana divide) "are inundated from October to March, and present the aspect of a great ocean studded with green islands. Across the Monde Grande a simply overturned tree would change the course of the waters." [1]

Central Plains—The Great Fluvial Basins

From the Venezuelan llanos to the Argentine pampas, and at one time even to the Patagonian tableland, the bed of the postulated inland sea has thus been maintained for many ages nearly at the same dead level, slightly upraised or filled in by detritus uniformly deposited, without anywhere developing any decided water-partings. The marine waters have merely been displaced by a single vast fluvial basin, which during the summer rains resumes in its upper reaches the aspect of a great inland sea many thousand square miles in extent, and discharges through three channels into the Atlantic Ocean. So fine is the pampean mud that in many extensive tracts not a rock or a rolled pebble is to be seen. When a native of the Mojos valley, which is still covered with this muddy silt, sets out on a journey to the neighbouring uplands, he is asked to bring back a stone or two that the people may see what such things are like. In some districts the old "beachèd margent of the sea" may be followed for many miles, as below Rosario, where, "after the pampean beds were formed and their southern and eastern margin began to emerge from the waters, the ocean along the shallow coast rolled up on the gently inclined plain quantities of shells, banks of which, miles in length, may be seen to-day far inland, giving evidence, by their curvature and general appear-

[1] Castelnau, quoted by Church, *loc. cit.* p. 389.

ance, of having been piled up along an ancient coast-line."[1] These shells belong to species still living in the neighbouring Atlantic waters, and embedded in the Pampean formation are also found widely distributed the fossil remains of the mastodon, megatherium, mylodon, and other gigantic members of the Pleistocene South-American fauna. Such huge beasts, with whom early man himself was undoubtedly associated, found ample sustenance in the rank vegetation that flourished amid the swamps and shallows of the slowly subsiding Pampean Sea. The human remains, presenting types similar to those of the Botocudos and some other surviving primitive races, are found distributed over a wide area both in the marine basin and on its eastern and western margins. The only highway between these two sections of the continent "must have crossed the elevated region at the head of the Pampean Sea, lying between 17° and 19° S. lat., which is still the only route in use for communication by land between Bolivia and Matto Grosso" (*ib.*).

In the northern or Amazonian section of the old inland sea the evidence of former marine action is quite as strong as Church has found it in the southern section. Here are everywhere to be seen horizontal sandstone and argillaceous beds ranging from 100 to 1000 feet in height, and constituting a vast system of sedimentary strata which can be traced from the foot of the Cordillera to the Atlantic. Even as far inland as the Pebas terraces of the Peruvian Marañon, Orton noticed thick beds of marine shells disposed in layers of diverse coloured clays, in which were represented as many as seventeen extinct species of late Tertiary times. When those beds were formed the Marañon, after forcing its way through the

[1] Church, *loc. cit.* p. 396.

Manseriche gorges, must have entered the marine basin through an estuary, which may be conceived as slowly moving eastwards according as the present Amazonian plains were filled in. It has even been suggested that in the Tertiary epoch the main stream flowed, not east to the Atlantic, but through the Orinoco-Negro depression towards the Caribbean Sea. In support of this view it has been pointed out that the marine shells of the Marañon cliffs resemble those of the West Indian waters. If so "the bluffs of Monte Alegre, the Santarem heights, and the other hills approaching the banks of the Amazon at the Obidos narrows, should be regarded as the remains of the ridge or dyke which formerly closed the basin of the inland sea and of the lakes ascending in terraces up the slopes of the Andes to Lake Titicaca."[1]

The southern (Pampean) section of the ancient Mediterranean had a probable length of 1400 miles, with a mean breadth of over 400 miles, and an area (including the Mojos section, 115,000) of about 715,000 square miles. But the *drainage* area of the present Parana basin is, of course, much greater, because it includes all the surrounding slopes. It greatly exceeds a million square miles, and the other interlaced fluvial systems present the same magnificent proportions, as shown in the subjoined table of the South American drainage areas,[2] where the enormous difference between the Atlantic and Pacific domains is specially noteworthy. The ancient inland sea was, like the Eurafrican Mediterranean, an inlet of the Atlantic; consequently the running waters by which it has been replaced continue to discharge into the same reservoir.

[1] Reclus, vol. xix. p. 99.

[2] Prepared on fresh data by Dr. Alois Bludau for *Petermann's Mitt.*, and reproduced in *Geogr. Jour.* (June 1897), p. 667.

	Sq. Miles.
Atlantic Slope	
Atrato	24,500
Magdalena-Cauca	102,500
Coast streams between Magdalena and Orinoco	94,500
Orinoco	364,500
Coast streams, thence to Amazon	190,500
Amazon-Tocantins	2,722,000
Coast streams, thence to Parnahiba	85,500
Parnahiba	133,500
Coast streams, thence to São Francisco	106,500
São Francisco	251,500
Coast streams, thence to the Plate	333,000
Plate-Uruguay	1,198,500
Colorado-Negro	464,000
Coast streams, thence to Cape Froward	210,000
Total Atlantic	6,382,500
Pacific Slope	
Colombian rivers	35,000
Ecuador ,,	41,500
Peruvian ,,	125,000
Chilean ,,	206,000
Total Pacific	407,500
Inland Drainage	
Lakes Titicaca and Aullagas	76,000
Landlocked basins, thence southwards	30,000
Total Inland	106,000
Summary	
Atlantic	6,382,500
Pacific	407,500
Inland	106,000
Total area drainage of South America	6,896,000

Orography—The Andes

The mountain ranges are laid down on the same broad lines, and here also, while the same symmetry and

simplicity are everywhere conspicuous, the presence of a later Miocene marine basin seems suggested by the contrasts and resemblances of the Andean and Brazilian systems. In early Miocene times the Andes must have presented the appearance of a low unbroken coast range, still, however, elevated enough to form an effective barrier between the Pacific and Atlantic basins. But throughout the later Miocene and the Pliocene epochs they were subjected to the same slow process of upheaval as the Alpine and Himalayan systems in the Old World, with the result that from Fuegia to the Atrato they constitute on their outer (seaward) face one of the loftiest and most regular mountain ranges on the globe.

A nearly due south-north trend is maintained for about half its entire length, from the Strait of Magellan to Arica in Peru, where it develops a great westward curve round to the Gulf of Darien. But throughout this northern section the same and even greater symmetry is displayed, the rocky walls keeping closer to the sea and at some points plunging sheer into the abysmal depths. Thanks to this astonishing uniformity, *Andes* (*Antis*), the native (Quichua) name of the Peruvian section, has been naturally extended to the whole system by the Spaniards, to whom the Pacific Coast Range as far as Fuegia is known as the *Cordillera de los Andes,* or simply the *Cordillera*[1] in a pre-eminent sense. Its mean altitude, estimated at about 14,000 feet, is so uniformly maintained that, seen from the Pacific, the crest looks like a perfectly regular bastion surmounted at intervals by sharp or rounded pinnacles, representing either old crystalline rocks or else extinct or still active craters. Even the geological

[1] From *Corda*, a cord or rope, as if to indicate the precision with which the crest has been drawn in *a line* with the coast.

A Map showing

THE ANDEAN CHAIN, THE BRAZILIAN HIGHLANDS

AND THE PRE-HISTORIC INLAND SEAS.

CARIBBEAN SEA
CENTRAL AMERICA
VENEZUELA
COLOMBIA
GUIANA
ECUADOR
PERU
BRAZIL
PARAGUAY
BOLIVIA
CHILE
ARGENTINA
URUGUAY
PACIFIC OCEAN
ATLANTIC OCEAN
Equator
Tropic of Capricorn
Falkland Is.
South Georgia
Galapagos
Cocos I.
Juan Fernandez
Trinidad
Orinoco
Amazons
Mouths of the Amazons
Rio de Janeiro
Buenos Ayres
R. de la Plata
Valparaiso
Lima
Callao
Guayaquil
Quito
Bogota
Caracas
Panama
Maracaibo
Pernambuco
Bahia
Santos
Montevideo
Valdivia
Concepcion
Iquique
Arica
Cobija
Cuzco
Lake Titicaca
Chanos Archip.
Chiloe I
Wellington I
Tierra del Fuego
C. Horn
Str. of Magellan
Stanley H.r
Port Stanley
Rosario
Cordova
Mendoza
Santiago
Valparaiso
Concepcion
Valdivia
Puerto Montt
Melipilli
Chiloe I
Chanos Archip.
Tres Montes Pen.a
Wellington I
Desire
Stokes B.
Desolation I
C. Froward
Southland
Staten I.
C. Horn
Falkland Is.
Stanley H.r
Str. of Magellan
Tierra del Fuego
Rio de Janeiro
Santos
Bahia
Pernambuco
Maceio
Penedo
Sergipe
Victoria
Barbacena
Diamantina
Lagoa Santa
Tarija
Cuyaba
Matto Grosso
Santa Cruz
Corrientes
Desterro
Rio Grande do Sul
Porto Alegre
Concordia
Uruguay
Entre Rios
Buenos Ayres
C. Corrientes
R. de la Plata
Bahia Blanca
C. S.t Maria
C. S.t Antonio
C. Three Points
C. of S. George
R. Chubut
R. Negro
R. Colorado
R. Salado
R. Parana
R. Paraguay
R. Uruguay
R. Madeira
R. Tapajos
R. Xingu
R. Tocantins
R. Para
R. Negro
R. Orinoco
R. Magdalena
R. Cauca
R. Atrato
R. Napo
R. Putumayo
R. Ucayali
R. Maranon
R. Javary
R. Purus
R. Jurua
R. Beni
R. Madre de Dios
R. Mamore
R. Guapore
R. Paraguay
R. Pilcomayo
R. Bermejo
R. Salado
R. Colorado
R. Negro
R. Chubut
R. Maule
R. Mapocho
R. Aconcagua
R. Loa
R. Lluta
R. Sama
R. Tacna
R. Camarones
R. Vermejo
R. Tarija
R. Grande
R. Pilcomayo
R. Paraguay
R. Parana
R. Uruguay
R. Negro
R. Colorado
R. Salado

formation is everywhere much the same, as shown, for instance, by the specimens brought back by the Fitz-Gerald expedition from Aconcagua and Tupungato in the South and by Mr. Whymper from the equatorial Andes in the North (Bonney). The peaks and cones themselves, ranging from over 15,000 to 23,000 feet, are distributed with singular even-handedness throughout the whole system, from the Chilean Aconcagua, Queen of the New World,[1] to the Chimborazo of Ecuador, long wrongly supposed to be the culminating point of both Americas, but, as shown in the subjoined table, considerably over-topped by several of the giants in the Cordillera itself:—

Region.	Peak or Cone.	Height in Feet.	Authority.
Bolivia	Sorata	23,500 (?)	Conway.
Argentina	Aconcagua	23,080	FitzGerald.
Bolivia	Illimani	22,500	Conway.
Chile	Tupungato	22,000	Güssfeldt.
Peru	Huascan	22,000	Hindle.
,,	Hualcan	21,000	Minchin (?).
,,	Huandoy	20,800	Wiener.
Ecuador	Chimborazo	20,498	Whymper.
,,	Antisana	19,335	,,
,,	Cayambe	19,186	,,
Peru	Tutupaca	18,960	Church.
,,	Misti	18,500	Weddell.
Colombia	Tolima	18,400	Vergara.
,,	Mesa de Herveo	18,340	André.
,,	Huila	18,000	Reiss and Stübel.
Ecuador	Sangai	17,464	,,
,,	Illiniza	17,405	,,
Colombia	Ruiz	17,390	Vergara.
Venezuela	Concha	15,420	Codazzi.
,,	Coluna		

[1] Unless she is to be dethroned by Sorata, whose old claims were tentatively revived in 1896 by Sir Martin Conway (*Geogr. Jour.* November 1898). And see *note*, p. 7 above.

The Brazilian and Guiana Uplands

Between the more recent Andean ramparts of the Pacific and the rugged weather-beaten Atlantic heights, the contrast is in every respect complete. Here symmetry and uniformity are replaced by the wildest confusion, and instead of young formations still preserving their original contour-lines almost intact under, in many places, cloudless skies, we have a chaotic grouping of very old rocks—crystalline and Archæan, with schists and early sandstones—here and there underlying Cretaceous and other Mesozoic deposits, and again exposed, reduced in height and carved into a great number of separate sections by atmospheric agencies in a region which, for untold æons, must have always been one of the wettest on the globe. "The eastern half of Brazil is undoubtedly ancient land, presenting no trace of Secondary strata, except in small detached areas near the coast, and where more recent Tertiary deposits are to be found only in a portion of the great valley of the Amazon. A mountain range, having various local designations, but which may best be called the Serra[1] da Mantiqueira, extends from the neighbourhood of São Paulo to the lower course of the Rio São Francisco for a distance of 1200 miles, and this is mainly composed of gneiss, sometimes passing into true granite, syenite, or mica-schist; and the same may be said of the Serra do Mar, a less considerable range lying between the main chain and the coast. To my mind the conclusion is irresistible, that ancient Brazil was one of

[1] It should be noticed that in the Portuguese domain the form *Serra* takes the place of the Spanish *Sierra*, a "saw," in reference to the *serrated* crests of eroded mountain ranges. Similarly the nasal *São* stands for *San* (Saint), as in *São Francisco* (Brazil) and *San Francisco* (California). The particles *do*, *da* are also contracted Portuguese forms replacing the Spanish *del*, *de la* ("of the," mas. and fem.).

the greatest mountain regions of the earth, and that its summits may very probably have exceeded in height any now existing in the world. What we now behold are the ruins of the ancient mountains, and the singular conical peaks are, as Liais has explained, the remains of some harder masses of metamorphic gneiss, of which the strata were tilted at a high angle."[1]

Thus, while the Cordillera has been steadily rising till it forms the loftiest range on the globe next to the Himalayas, the Brazilian system has been worn down to a mean altitude of probably not more than 4000 or 5000 feet. Even the culminating point of Brazil—Itatiaya (Itatiaiossú), in the Mantiqueira range, falls below 10,000 feet, and is reduced by some measurements to no more than 8900 feet. The loftiest peak of the picturesque "Organs" group in the Serra do Mar is little over 6600 feet, while those of the ranges forming the divides between the São Francisco and the Tocantins and other southern affluents of the Amazon nowhere exceed 6000 feet. In the extreme north the Pacaraima chain towards the Guiana and Venezuelan frontiers terminates in the mighty Roraima mass (7384), which is a point on the recently determined British-Venezuelan frontier. Pacaraima consists also of very old (Archæan and Palæozoic) formations, and its base must have been washed by the ancient South-American Mediterranean. Farther west the still more elevated Guamapi range culminates in Mount Icutu, which has an estimated altitude of 11,000 feet.

Subsidence and Upheaval

That subsidence as well as erosion has contributed to modify the character of the old Brazilian Alps is evident

[1] Ball, *op. cit.* p. 314 *sq.*

from the now well-established fact, that while the land has gained on the Pacific side it has been largely encroached upon by the Atlantic waters on the Brazilian seaboard. Hence the remark made by some physiographists that South America is moving westwards, and is now nearer to Australia and farther from Africa than in Secondary times. On the coast of Chile there are terraces due to erosion, but also others which are unquestionably marine beaches, affecting the form of flights of steps, and strewn to a height of over 1000 feet with thick beds of shells belonging to the species still surviving in the neighbouring seas.

But the opposite phenomenon is seen on a large scale on the Atlantic side, and especially about the Amazon estuary. Here the long-continued invasions of the sea are not only arresting the formation of a delta by distributing the sedimentary matter all round the shelving shores of Guiana, but are, so to say, transforming the great estuary to a marine gulf. The main stream has already lost over 400 miles of its lower course, and the old river banks are now permanently flooded as far seawards as the 100-fathom line. Hence it is that the Parnahyba and several other streams which formerly joined the south bank now find their way to the coast in independent channels. Even the Tocantins has almost ceased to be an affluent of the Amazon, with which it is connected only by an intricate system of shifting lateral branches.

Flora

One of the most eloquent passages in Buckle's *History of Civilisation in England* was inspired by the study of animal and vegetable life in Brazil, which, excluding the Andean plateaux and the narrow southern extremity,

may be taken as in this respect the typical region of the whole continent. It is pointed out that the progress of mankind beyond the savage state has here been retarded, and even arrested, by the prevailing excess of heat and moisture, a combination far more favourable to the development of vegetation and of the lower than of the higher animal organisms. Hence no other region of the globe except the Malay lands, where like conditions prevail, can compare with South America in the relative extent, vigour, and variety of its forest growths, and of its exuberant insect life. For a vivid picture of sunless and trackless woodlands of boundless extent, the mind turns less readily to the Congo forest zone, vast though it be, than to the densely-timbered Amazonian plains, which are continued with little interruption far up the eastern slopes of the Cordillera, through the Guianas round to the shady rivers Magdalena and Atrato in the far north-west, and in other directions over a great part of Southern Brazil, of Corrientes and Gran Chaco, traversed by all the northern and western head-waters of the Parana-Paraguay system.

Even in the uplands a rich arborescent vegetation creeps up to within 3000 feet of the snow-line, which, however, is here, as elsewhere, a "variable quantity," depending, as it does, not so much on latitude as on the aspect of the land, light and shade, moisture and other local conditions. Indeed Mr. Whymper objects to the expression altogether, seeing "little utility in retaining a phrase which is incapable of definition, and is interpreted so variously" (p. 347). But in general it ranges between Panama and Patagonia from 14,000 to 16,500 feet, falling in Tierra del Fuego to 4900 feet. In the equatorial region flowering plants, such as ranunculi, mallows, fuchsias, verbenas, asters, and

other *compositæ* occur between 14,000 and 16,000 feet. Mosses and lichens mantle the summit of Corazon (15,870), and on other slopes reach much higher, while currant bushes and tall grasses 8 to 9 feet high fall little below 14,000 feet.

In the same region, and as far south as Bolivia, the eastern escarpments of the plateaux exposed to the moisture-bearing Atlantic breezes are clothed with conifers and other forest growths up to an altitude of 11,500 or perhaps even 12,000 feet. So numerous are the indigenous useful species both in the *montaña*, as these wooded uplands are called, and almost everywhere in the Amazonian and the other great fluvial basins, that since the discovery Europe has derived more alimentary, medicinal, and other economic plants from South America than from any other quarter of the globe. Such are the potato with its cousin the tomato, tobacco, maize, yams, Brazil nuts, ground-nuts, guava, the pine-apple, rubber, ipecacuanha, sarsaparilla, cacao, coca, chinchona,[1] and several cabinet-woods.

In the Brazilian uplands the tropical flora ranges southwards to the Santos district of the province of São Paulo beyond Capricorn. Here "trees and shrubs in wonderful variety contend for the mastery, and maintain a precarious struggle for existence with a crowd of climbers and parasites. So dense is the mass of vegetation that it is impossible to penetrate in any direction farther than a few yards, and there is no choice but to follow the track that leads to the summit of the slope."[2]

A general survey of the South American flora reveals

[1] The very best species of this quinine-yielding plant have only lately been discovered in the forests about the sources of the Inambari, an affluent of the Madre de Dios draining the Peruvian province of Caravaya (Sir Cl. Markham, *Geogr. Jour.* (Feb. 1896), p. 188).

[2] Ball, p. 307.

an exceptional number of indigenous types, especially of flowering plants. Some of these may, no doubt, have originated in the Cordilleras; but the chief area of birth and dispersion would appear to have been the older

CHINCHONA.

Brazilian highlands, at a time when they enjoyed a climate suitable for such developments. "At a period when physical conditions in the lower regions of the earth's surface were widely different, and the proportion of carbonic acid gas present in the atmosphere was very much greater than it has been since the deposition of the

coal-measures, it was only in the higher regions of great mountain countries that conditions prevailed at all similar to those now existing." Hence, "if the early types of flowering plants were confined to the high mountains, we could not expect to find their remains in deposits

TAPIR.

formed in shallow lakes and estuaries, until after the probably long period during which they were gradually modified to adapt them to altered physical conditions." It is therefore on the ancient Brazilian uplands that we should look for "the ancestors of the many forms of vegetation which have stamped their character on the vegetation of the continent" (Ball, p. 318).

Fauna

No more striking illustration of Buckle's broad inference could be afforded than the remarkable fact that, from the region which has enriched civilisation with

RHEA.

so many valuable economic plants, the Old World has obtained not a single useful animal. The aborigines themselves had domesticated the llama (which, like its Asiatic congener, was endowed with a somewhat morbid temperament, rendering it useless for the rough work of

cultured peoples in other lands), and the alpaca, guinea-pig, and alco, all, however, confined to the limits of the Peruvian empire. There are many indigenous forms, some, like the tapir, peccari, jaguar, spectacled bear, puma, cayman, rhea ("ostrich"), and several of the lower anthropoid apes, allied to the corresponding genera or orders in the eastern hemisphere, and often presenting much interest to naturalists. But all these and the many other native species—sloth, vampire, ant-eater, agouti, tree-porcupine, viscacha, anaconda, toucan, humming-bird, and others—are of little or no economic use.

The South American Neogæic Realm

In Prof. Lydekker's scheme of the geographical distribution of mammals, South America, with the West Indies and the central peninsulas and isthmuses as far north as South Mexico, constitutes the "Neogæic Realm," that is to say, the zoological zone which is most characteristic of the New World and has least in common with the Old.[1] The reference, of course, is not to post-Columbian times, during which the region has been peopled by multitudes of such useful animals as the horse, ox, sheep and pig, but to the lowest Miocene age, when South America was an area of evolution and dispersion for many generalised[2] animal as well as vegetable forms.

At that time the South American fauna differed far more than it does at present from that of the rest of the

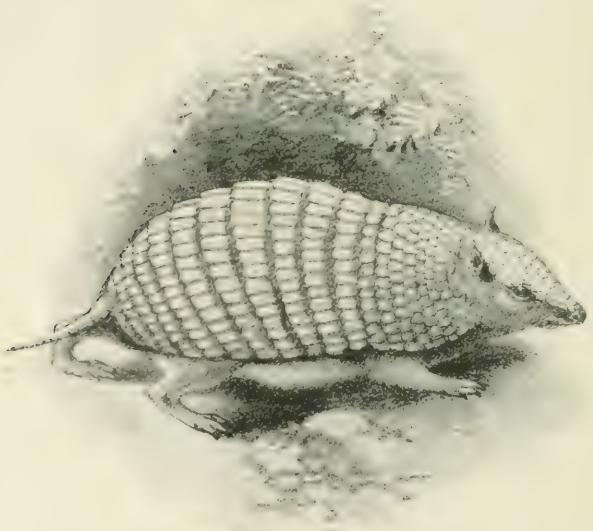
[1] *A Geographical History of Mammals*, Cambridge, 1896.

[2] By a *generalised* type or form, to which is opposed *specialised*, is understood, in biological language, an organism of lower or less complicate structure from which spring higher organisms in diverging lines of development. Thus from a common simian ancestor of relatively simple structure are derived the higher man-like apes by slow processes of specialisation extended over long periods of time.

world. This may be accounted for by its isolation from the northern continent before the completion of the land-connection at the isthmus of Panama in the late Miocene epoch. In any case it is placed beyond doubt by the extraordinary profusion of peculiar mammalian and other animal remains of the Pleistocene, if not even of the Pliocene tertiary epoch, found in various districts, especially of South Brazil and Argentina. Such sites as the Lagôa Santa caves of Minas Geraes, the so-called "Pampean beds" of the Pampas, and the vast shell-mounds ("kitchen-middens") of the seaboard north and south of the Plate estuary, have yielded great quantites of the bones of such gigantic creatures as the mastodon, the ground-sloth, mylodon, and many others, often in the closest association with those of early man himself, thus showing that these monsters had survived down to comparatively recent (Pleistocene) times. What has become of them? What has become of the extensive forest growth in which some of them found congenial homes, and which at that time covered large tracts of the now treeless Pampas plains? "During the whole time that the alluvial deposits of the Parana and Paraguay rivers were being laid down, and well on into the human period, the mammalian fauna of the Pampean epoch continued to flourish, until there came a complete sweep of all the larger forms, clearing off the whole of the ground-sloths, glyptodonts, mastodons, toxodonts, horses, sabre-toothed tigers, and the larger members of the camel tribe, and in the Argentine leaving only armadillos, guanacos, a few deer, a number of rodents, various cats and foxes, as well as skunks, to represent the vast assemblage of strange and giant creatures that once roamed over its plains. Still more remarkable is the former abundance of gigantic ant-eaters, dependent on forests for their existence, in the tracts now occupied by

the coast deserts of Tarapaca. It is practically certain that the clean sweep of the forests of Argentina and the larger mammals of the whole of South America is not due to the hand of man.

The problem is further complicated by the circumstance that the fossil remains of nearly all the larger animals



ARMADILLO.

which formerly inhabited the Pampas are also found in the caverns of Brazil, where the climate is now, and probably always has been, tropical. Up to the present it is, accordingly, impossible to account satisfactorily for the disappearance of all the larger forms from among the mammalian fauna of South America." [1] May the ultimate

[1] Lydekker, p. 121.

solution be found in Colonel Church's restored Pampean Sea, taken in connection with the gradual wearing down of the Brazilian Alps and the consequent change of climate, making the environment, as indicated by Buckle, no longer favourable for the existence of large animal forms?

CHAPTER II

EARLY ETHNICAL RELATIONS

Inhabitants of South America—Primitive man in South America of two Types—Physical Characters of the Aborigines—Their Polysynthetic Speech—Number and Distribution of the South-American Languages—The Lingoa Geral—Table of the South-American Stock Races and Languages—General Culture—Contrasts between North and South—Iso-cultural Zones—The Cultureless Zone—The civilised Zone.

Inhabitants of South America

But from the cataclysm, if such it was, which swept away the old Pampean fauna, man survived. That he had spread in early Pleistocene times from his eastern cradle to the New World by probably two routes—from Europe by the still persisting land-connection with Greenland and Labrador, and from Asia by the narrow Bering Strait—has been placed beyond reasonable doubt by the discovery of his works and even of his remains in many parts of the western hemisphere. These fossil remains, representing both of the two primordial types, which may be called the long-headed Afro-European [1] and the round-headed Asiatic, are, strange to say, found in far greater abundance in the southern than in the northern division.

[1] In this compound expression the first term has no reference to the African Negro, but to the African Hamite of Caucasic type, who passed with the Pleistocene fauna into South and West Europe, and thence presumably to the New World.

In fact North America has nothing to show of early man himself apart from his handiwork, except the still somewhat doubtful round-headed "Calaveras skull" from the gold-bearing Californian drift; whereas several crania and even skeletons of both types have been found widely distributed between the numerous *paraderos*, or ancient settlements of the Pampas beds in Argentina, the Lagôa Santa caves, and the *sambaquí* or shell-mounds strewn along the coast from Santa Catherina in Brazil to and beyond the Plate estuary. A skull of round shape was found by Roth under the carapace of a huge glyptodon near Pontimelo, and another by Lund in the Lagôa Santa district, where, however, the long-heads greatly predominated, as they did also in the paraderos, in the shell-heaps on both sides of the Plate estuary, and as far north as Santarem and Marajo Island in the Amazon estuary.

Few fossil remains of early man have yet been brought to light in Patagonia, and none in Fuegia. But his presence in both regions is attested by the numerous stone implements found deeply embedded in the banks of the Rio Negro, and in the very old shell-mounds of vast size occurring in several parts of the Fuegian Archipelago. One of these rivals if it does not exceed those of the Brazilian and Buenos Ayres seaboard in age and extent. Lovisato describes it as still nearly a mile long, although greatly eroded by the waves, and rising 24 feet above the present sea-level, while the shells of which it mostly consists are much larger than the corresponding species now inhabiting the surrounding waters.

Primitive Man in South America of two Types

From these and many other data, which need not here be further specified, the inference seems inevitable,

that South America was already in Pleistocene times peopled to its utmost limits by the two primitive races that still persist in the same region. The long-heads are believed to have been the first arrivals, and their subsequent migrations from the early settlements in South Brazil and Argentina have been followed in all directions, north to Guiana, east to the São Francisco and to the Botocudos of the Aimores Coast Range, west to Santa and even to Ancon on the shores of the Pacific, south to the long-headed Onas and Yahgans of Fuegia.

Later came the round-heads, keeping generally to the Pacific side, and in pre-Columbian times developing several centres of culture, such as those of the Muyscas (Chibchas), Yuncas (Chimus), Quichuas (Peruvians), Aymaras or Collas (Bolivians), along the line of Andean plateaux from the Cundinamarca district in Colombia to Chile. With these might be grouped the ruder but more vigorous Chilean Aucas (Araucas, Araucanians), who spread eastwards to the Colorado and Negro rivers, where they were till lately represented by the round-headed Puelches, not to be confounded with the more primitive long-headed Tehuelches or Chuelches. The former were the Pampas Indians, the latter the Patagonians of the early writers, but both are now either extinct or swept into reservations.

With the arrival of the round-heads, probably before the close of the Pleistocene age, what may be called the first settlement of the land was completed. After that, till the advent of the white man, no serious contributions could have been drawn from any quarter, the long narrow isthmian links between north and south preventing invasions in numbers sufficiently large to overcome the resistance of those already in possession of the rugged Colombian uplands. From this rapid survey

we may therefore conclude that the constituent elements of the true aborigines were twofold—long-heads of unknown origin and short-headed Asiatic Mongoloids, the former mainly in the east, the latter mainly in the west. Before the subsidence of the great inland sea the two groups must have kept somewhat apart, each advancing or lagging behind in the general onward movement of human development, in conformity with the more or less favourable character of their respective environments. But after the disappearance of the intervening waters, impassable by populations whose knowledge of navigation never at any time advanced beyond the rudimentary state, contacts hostile or friendly become more frequent, and free intercommunications established especially along the transverse line of the low water-parting, as above indicated by Colonel Church.

Physical Characters of the Aborigines

Thus were gradually softened or even blurred the at first sharply contrasted Mongolic and Caucasic features, so that we have now rather a general Mongolo-Caucasic type, which may rightly be called *American.* It is a blend of scarcely yet specialised European and Asiatic characters, further modified in a new environment, just as these were themselves developed from a generalised Pleistocene ancestor in their respective environments. So true is this that the latest and best observers, such as Dr. Ehrenreich[1] and his associates, declare that these aborigines are a product of the soil, like all other long-isolated organisms, and are no more Mongols than they are Caucasians.

[1] See especially this traveller's masterly treatise on *The Aborigines of Brazil,* Brunswick, 1897.

They even go further, and assert that the South Americans approximate on the whole nearer to the Caucasic than to the Asiatic, so that we have travelled far from the days when ethnologists thought they had settled matters by writing off the inhabitants of the New World as "a branch of the Mongol stock." From the Caucasic they have inherited a tall stature, fairly symmetrical frames, round straight eyes, large, straight or aquiline nose, and, as should be expected, all these traits are most conspicuous on the east side. To the Mongol they are indebted for their long, lank, black hair, large though not very prominent cheek-bones, and a yellowish-brown complexion, which often shades off to a lightish brown or a coppery tinge, with little trace of yellow or of the "red" hue popularly attributed to them. To the Mongol may also be in some measure due that sullen, or at least, reserved, and outwardly impassive temperament, which is so highly characteristic of those aborigines, and is at the same time so strongly illustrated in their peculiarly heavy and massive speech.

Their Polysynthetic Speech

But this speech is entirely their own, so much so that not even its germs can any longer be traced to the Old World. The American differs from all other linguistic groups not merely in its vocabulary and grammatical structure, but in its very morphology, so that it must be classed, like plant or animal forms, in an order apart from all others. The germs, no doubt, were brought with their Pleistocene ancestors from the eastern hemisphere, but in the process of evolution in their new homes have been obliterated past recovery.

This very evolution itself has resulted in the new

"Order," which takes the name of *polysynthesis*, to indicate its most striking feature, that is, a tendency to extreme synthesis or composition, in virtue of which all the words of the sentence may be merged in a single term often of prodigious length. Such massive expression of heavy thought is effected partly by syncope, that is, by clipping and cutting down the several words themselves, by which, for instance, *regn-boga* is reduced through *rén-boga* to *rainbow;* but mainly by embodying the relational elements, attributes and even the nominal object in the verbal root, so that it becomes impossible to say "I strike," but synthetically "I-man-strike-dog" (or some other object) repeatedly (or in some other way), etc., all in a breath. Now this strange mode of thought and expression, which is absolutely unknown elsewhere, prevails, with a few trifling and explicable exceptions, throughout the whole continent from Alaska to Fuegia, as may be seen by two such examples as the Eskimo *igdlorssualiortugssarsiumavq* and the Hipurina (Amazonian) *Nicuçacatçaturumatinii.* Here culture-stages make not the slightest difference, and the cultivated Aztec and Quichuan are cast in precisely the same mould as the rude Tarascan or Patagonian.

Number and Distribution of the South-American Languages

Another point to be noticed is the extraordinary number of stock languages, which are variously estimated for the whole continent at from 100 to 200 or more, for nobody exactly knows, and of these perhaps one half may be assigned to South America. By stocks are to be understood linguistic groups which have nothing in common beyond their general polysynthetic character, and are as irreducible to a single mother-tongue as are, for

instance, the Semitic and Aryan groups in the Old World. In the whole of Europe there are only two such stocks, —Aryan and Basque, Finno-Turki being a comparatively recent intruder. How then are perhaps fifty times more current amongst an indigenous population thirty or forty times less? It is a wonderful phenomenon, as inexplicable as is the total disappearance of the Pleistocene fauna and flora.

Attention should here be called to the extremely irregular distribution of these linguistic groups, which, as in North America, are mostly crowded together in small spaces on the west side of the continent, where one alone —Quichua-Aymara— ranges over a wide domain, not however, conterminous, as is often assumed, with that of the old Peruvian empire. In the central and eastern regions there are several such linguistic families, notably the Carib, Arawak, and especially Tupi-Guarani, which are spread over vast areas, and the limits of which have even been enlarged by recent exploration. Thus the Carib, hitherto supposed to have originated either in Guiana or the Antilles, if not even on the North-American mainland, spreading thence southwards a little beyond the Orinoco basin, is now shown to have had its cradle about the head-waters of the Xingu and other southern affluents of the Amazon in the very heart of the continent, whence the migratory movements were directed northwards to the West Indies if not even to Florida, before that peninsula was occupied by the Seminoles.

The Lingoa Geral

Owing to other causes, of a social and political rather than of an ethnical nature, a still wider expansion has been given, not to the Tupi-Guarani race, but to the

Tupi-Guarani language, which has become the so-called *lingoa geral*,[1] that is, the "general language," the *lingua franca*, or common medium of intercourse, not only amongst the natives but even amongst some of the mixed European populations throughout half the continent. With the development of missionary enterprise the Jesuits, who from the first took a foremost part in this work, soon discovered that their operations were greatly hampered by the multiplicity of local dialects, to which the neophites clung with great tenacity. To force upon them their own Spanish or Portuguese tongue was found to be impossible, so that the only alternative was the adoption of some native form of speech, the genius of which would be better suited to their mental capacity.

For the Andean plateau regions the Quichuan of the Peruvian empire was naturally selected, and for the rest of the continent the still more widespread Guarani-Tupi, whose numerous branches ramified over a great part of the Amazon and Upper Parana basins, and were also current amongst the numerous Tupi tribes of the Brazilian seaboard. Preference was eventually given to one of these Tupi forms, which was accordingly introduced into all the stations throughout the Portuguese and many of the Spanish possessions, especially about the Parana-Paraguay confluence. All the natives resorting to the Missions were required to learn this "common speech," which was also taught in the schools, employed in the pulpit, and used for general administrative purposes.

This policy was attended by permanent and far-reaching

[1] This Portuguese form has taken precedence of the Spanish *lengua general*, because the Brazilian *lingua franca* has obtained far greater currency than that adopted for the Andean regions.

results. Having once realised the advantage of such a general medium of intercourse, the natives continued to avail themselves of it even after the expulsion of the Jesuits and the suppression of the missions, and although afterwards many of the tribes relapsed into paganism and the savage state. Thus it has come about that the dialect of an obscure coast tribe, slightly modified and reduced to written form by European missionaries, has become widely diffused throughout Brazil, Paraguay, Corrientes, and some other parts of Argentina. It appears to be still spreading amongst the aborigines, and, like Quichuan in Peru and Maya in Yucatan, is even current amongst some of the mixed European communities themselves.

In the subjoined table all the chief South American peoples are grouped as far as possible according to their respective stock languages, which, in the midst of so much physical uniformity, are found to be the most convenient if not the only means of classification. It should be noted that although many are stated to be "extinct," this does not necessarily mean extirpation, but often nothing more than disappearance, by absorption in the politically or socially dominant people.

SOUTH AMERICAN STOCK RACES AND LANGUAGES

Stocks.	Main Divisions.	Domain.
Chibcha	*Nutibara, Tataba, Guaca, Tunebo*	Cauca Valley.
	Paucura, Petacay, Timba, Pastu	Head-waters of R. Magdalena.
Choco	*Baudo, Tado, Noanama, Citarae*	Rs. Atrato and San Juan.
Paeze	*Colima, Manipo, Naura*	Upper Magdalena.
Coconuco	*Barbacoa, Cayapa, Cuaiquerre, Mocao*	Colombia-Ecuador frontiers.

Stocks.	Main Divisions.	Domain.
Quitu	*Cayambe, Puritacu, Cullahuasa, Linguachi, Cataballu*	North of Quito.
	Cara	Coast, Charapato to Cape S. Francisco.
	Carangue	Bordering on the Pastus.
	Llacta-cunca, Ambatu, Mucha, Puruhu, Tiquisambi, Saroi, Cañari, Palta (near Loja), Zaizu (about Zaruma)	South of Quito.
	Huancavilca	I. of Pana and coast to Pta. Sta. Elena.
	Manta	Coast N. of Huancavilcas.
	Tacami	Coast at Atacames.
Chinchasuyu	*Ayahuaca (Cassa and Callua)*	N. to borders of Quitu Domain.
	Huancapampa	Near Jaen de Bracamoras.
	Huacrachucu	Both sides of Marañon gorges.
	Chacha (Chachapuya)	Mountains on right bank Marañon.
	Cajamarca	Cajamarca Valley.
	Huamachucu	Lower down on the Marañon.
	Conchucu	Marañon and head-waters of coast streams.
	Huanucu	Head-waters of R. Huallaga.
Inca	*Huanca*	Jauja and Torma Valleys.
	Hucana, Sora	In the Coast Cordillera.
	Chanca	From Guanta to the R. Apurimac.
	Inca	Cuzco and Vilcamayu Valley.
	Quichua	Rs. Apurimac and Pachachoca.
	Cana, Canche	Head-waters R. Vilcamayu.
Aymara (Collasuyu)	*Colla*	N. of L. Titicaca.
	Lupaca	W. side L. Titicaca.
	Pacasa	E. side L. Titicaca.
	Caranguu, Quillaca	S. side L. Titicaca.
	Uru (of Puquina speech)	S.-W. corner L. Titicaca.
	Calchaqui (of Quichua speech)	Prov. Tucuman and southern parts of Gran Chaco.
	Atacameño (?)	Atacama district.
"Yunca"	*Chimu, Lambayaque (both of Mochica speech)*	Prov. Trujillo.
Chango		Tarapaca.
Huanca	*Pre-Inca race (now of Quichua speech)*	Peruvian Coast from Parmunca to Acari (9°-14° S.)

Stocks.	Main Divisions.	Domain.
	Anti or Campa . . .	Upper Ucayali and its affluents.
Antisuyu .	*Chuncho* :— *Huachipayri, Tuyuneri, Sirineyri*	Forests E. of Cuzco.
	Caranga, Suchimani . .	Prov. Caravaya, E. of Tarma in Peru.
Jevero . (Jivaro)	*Aguaruna, Antipao, Huambisa, Ibanoma, Iquito, Cotopasa, Pindo, Paute*	Between Rs. Chinchipe and Pastasa ; and both sides R. Marañon.
Zaparo .	*Ahuishiri, Andoa, Curaraye, Matagene, Manta, Nugamu, Nushinu, Rotuno, Shiripuno, Sinchictu, Supinu, Tiputini, Yasuni*	R. Napo basin, and thence to the R. Pastasa ; about 12,000 sq. miles.
Betoye .	*Pioje, Ocoguage* . . .	Rs. Napo and Putumayo.
	Ele, Situja	R. Casanare.
	Tama, Acanejo . . .	Rs. Yari and Cagua.
	Amaguage, Correguage, Cenceguage, Zeona	Rs. Caqueta and Rutumayo.
	Uaupe, Tucano	R. Uaupe.
Pano . .	*Aguana, Cholone, Motilone, Jibito, Ajuana*	R. Huallaga.
	Amajuara, Pirro, Capanahua, Cashibo, Conibo, Remo, Setebo, Shipibo, Senci	R. Ucayali.
Ticuna, Tacuna, or Jumana	*Caruana, Jajunuma, Jamolapa, Picuama, Jocacurama, Malinuma, Lamarama, Varauama, Urizsama*	Rs. Putumayo and Marañon about Tabatinga.
Juri . .	*Juri-coma, Cacao, Moira, Assai, Curassi, Oira Açu, Tucano, Ubi, Uehytu, Taboca*	R. Amazon, between Rs. Putumayo ad Japura and Rio Negro.
Tacana .	*Araona, Equari, Maropa, Tumupasa, Maracani, Toromona, Pucopacari*	Upper Madre de Dios Basin.
Leco . . (Mosetene)	*Guarayo, Siriona, Jacare* . .	Tipuani affluent of R. Beni.
Purus Groups.	*Canamari, Catacaji, Aquiri, Cutuquira, Hipurina, Jamamari, Manetenerí, Pammary, Puru-Puru*	Rio Purus.
Mojos Groups.	*Bauré, Movimo, Eriruma, Tapacura, Itonama, Caniciana, Sapi, Bolepa, Tiboi, Rotoronno, Pechuyo, Mure, Cayababa*	Rs. Mamore and Beni.
Barré .	*Tapacuraca, Napaca, Paunaca, Paiconeca, Quitemoca, Moncaca, Zuracarijuia*	Rs. Cassiquiare, Maraina and Upper Negro.

Tupinjas

Stocks.	Main Divisions.	Domain.
Curetu	*Isanna* (?) *Uaenambu* (?)	Bet. Rs. Japura and Uaupe.
Carabuyana	*Caraguana, Pocoana, Moacarana, Yaribaru, Mariguyana, Yarucaguaca*	R. Japura below Basururu confluence.
	Atorai, Wapisiana, Amaripa	British Guiana.
	Maypure, Baniva	R. Orinoco.
	Yuana, Marawa	R. Amazon.
Arawak	*Goajiro* (?), *Cocina* (?)	Goajira Peninsula.
	Vaura, Mahinacu	Upper Xingu.
	Parexi, Cabsi	Upper Tapajos.
	Kwana, Layana	Upper Paraguay.
	Arawan	Marajos Is.
	Bakairi, Nahuqua	Upper Xingu.
	Pamella	Lower Guaporé.
	Apiaca (*Apeiaca*)	Lower Tocantins.
	Apoto, Wayawai	Brazilian Guiana.
	Galibi, Rucuyenne	French ,,
Carib	*Calina*	Dutch ,,
	Akawai, Arecuna, Macusi, Paramona	British ,,
	Makirifaré, Mayongeong	Venezuelan ,,
	Uitoto, Coreguajé, Carijina	Upper Yapura.
	Calib (*Carib*)	Is. St. Vincent, Honduras.
Warrau	*Guarauno*	Coast between Rs. Orinoco and Corentyns.
Tupi	*Tupinamba, Tanuyo*	Lower Amazon, R. Para.
	Tupajaro, Temba	R. Para.
	Jacunda, Pacaia, Tecuna-Pena	Lower Xingu.
	Aneto, Manitsawa, Camayura	Upper Xingu.
	Emerillon, Ovampi	French Guiana.
	Goajire, Tocantins	R. Tocantins.
	Omagua, Cocâma	Lr. Huallaga and Marañon.
	Petiguare	R. Parahiba.
	Cahete	R. São Francisco.
	Tupininquin	Prov. Espirito Santo.
	Tapiguae	Coast from Pernambuco to St. Paulo.
	Tapinambaze	Provs. Bahia, Sergipe, and Pernambuco.
	Tummimivi, Tamoiae	Rio de Janeiro.
	Mundrucu	R. Tapajos and right bank Amazon.
	Manhe: Tatu, Tasiâha, Guariba, Inamba, Caribuna	Between Rs. Tapajos and Amazon.
Guarani	*Chiriguano, Siriono*	Gran Chaco and S.E. Bolivian frontiers.
	Guarani proper	Paraguay, Entre-Rios, Misiones.
	Guarayi	Now in Mojos Missions.
	Diaguite	Prov. Tucuman.

Stocks.	Main Divisions.	Domain.
Chiquito Group	*Tapacuraca, Napaca, Paunaca, Paiconeca, Quitemoca, Moncoca, Zuracariqnia*	Between Rs. Mamoré and Itenez.
Bororo	*Yaraye*	Matto Grosso, Goyaz.
Ges (Tapuya)	*Botocudo (Burung)*	Aymores Mts. and R. Doce, E. Brazil.
	Camacan, Patacho, Massacora	E. Brazilian Forests.
	Cayapo (North)	Rs. Araguaya, Xingu and Tocantins.
	Cayapo (West), or Suyo	Upper Xingu.
	Cayapo (South)	Parana head-waters.
	Akua (Cherente, Chavante)	R. Tocantins.
	Caraya, Aruma	R. Xingu.
	Apiacare	R. Tapajos.
Payagua	*Payagua proper*	Both sides R. Paraguay about Asuncion.
	Chacamoco, Angaïte, Sanapana	Right bank R. Paraguay in Gran Chaco.
	Cadjuevo	Left bank Paraguay, Brazilo-Paraguay frontier.
Charrua	*Minuane, Guenoa*	Rs. Parana and Uruguay.
Abipone or Callagae	*Naquegtgaguehee, Rucahee, Jaconiaga*	Rs. Bermejo and Rio Grande, Gran Chaco.
Lule	*Lule proper, Vilela: Ontoampa, Yeconoampa, Ipa, Paiaine*	Gran Chaco.
Mataguayo (Mataco)		R. Bermejo, Gran Chaco.
Mocobi		Gran Chaco.
Toba	*Pitilaga*	Rs. Pilcomayo and Bermejo.
Churumata and Chichas Orejones		Gran Chaco between the Chiriguanas and Guaycurus.
Guaycuru		Between Rs. Pilcomayo and Yaveviri, Gran Chaco.
Araucano	*Moluche, Picunche, Puenche, Peye, Keye*	Chilian Andes, Coast and Islands.
Puelche (Gennaken)	*Ranqualche (Ranquele), Querandi*	Pampas, S. to R. Negro.
Tehuelche	*Calilehet, Culinan, Yacana, Ona*	Patagonia, E. Fuegia.
Yahgan and Alacaluf		Central and W. Fuegia.

General Culture—Contrasts between North and South

A closer study of these multifarious populations reveals the striking fact that all the cultured or semi-

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ETHNOLOGICAL
and
PHILOLOGICAL MAP
OF
SOUTH AMERICA

Showing the General Distribution of the
INDIGENOUS RACES
And the Position of the various
LINGUISTIC FAMILIES

Names of Stocks – ARAWAK
" " *Sub divisions* – Maypure

Stanfords Geog. Establishment London.

London: Edward Stanford, 12, 13, & 14, Long Acre, W.C.

cultured peoples have from all known time been confined to the comparatively narrow western uplands between Colombia and Chile, while at the discovery the rest of the continent was, and in some measure still is, a seething mass of utter savagery. In most other regions the bulk of the inhabitants stand on or about the same plane of general progress, or at least the transitions are gradual from the lower to the higher states. Such is especially the case in North America, where under more favourable climatic relations the natives, taken as a whole, had advanced considerably beyond those of the south. Here the ruder tribes have nothing to show comparable to the mounds of various types scattered, in some places profusely, over the Mississippi valley and the Appalachian lands. The Iroquois, Algonquins and others, supposed to be purely hunting or predatory tribes, had brought considerable tracts under cultivation in pre-Columbian times, and the passage is almost imperceptible from the mound-builders to the more settled Natchez, Seminole, and other groups in the south-east, and again to the still higher Pueblo communities in the extreme south-west (Arizona, New Mexico).

Iso-Cultural Zones

But in South America there are no transitions, or only such as in later times had been developed to a limited extent with the eastward expansion of the Incas' political sway down the slopes of the Cordillera, without anywhere quite reaching the lowlands. In fact it would almost seem as if the policy of the Incas was rather to defend the approaches to their upland citadels from the attacks of the ferocious Chunchos, and other savage denizens of the forests watered by the Amazonian head-streams, than to

extend the bounds of the empire in that direction. Yet several military expeditions were sent eastwards, and large tracts of the Montaña conquered and permanently incorporated in the empire. At the same time all the slopes by which Cuzco and the other eastern districts might be reached from the Upper Ucayali (Yucay, Urubamba) were guarded by formidable works planned and executed with remarkable engineering skill. The Yucay valley was defended by the extensive fortifications of Pisac, where every height was crowned with towers, every inequality in the rocks or other vantage ground filled in and faced with smooth slabs impossible to scale, every strategic point occupied by defensive works scarcely surpassed by ancient or modern military science.

A line traced from a little east of Bogota along the windings of the Andean plateaux to about 30° S. and then deflected down the Maule valley to the coast, that is, along the southern limit of the Peruvian empire, will mark off with sufficient precision the cultural and savage or barbaric zones to the right and left, and will at the same time show how immeasurably the latter exceeded the former in extent. The Incas' capital, Cuzco, within 280 miles of the Pacific, stood close to this parting-line, so that, in a day's journey down the head-waters of the Ucayali, you passed abruptly from a land of orderly government, with well-developed political and social institutions, to a region bounded eastwards only by the Atlantic, where not a single community could be met which had advanced beyond the fully organised tribal state.

Of all these countless fractions of humanity the Aucas, just south of the Maule frontier, were amongst the most advanced. Yet they had neither properly constituted tribal groups nor hereditary chiefs, nor even patriarchal

jurisdiction. No man recognised the authority of anybody; the father scarcely ventured to exercise his natural influence within the narrow family circle; there were no serfs or slaves, no social distinctions of any kind. If the nation, for such nevertheless it was, held together, and if the ethical standard was high, it was due partly to the love of freedom, by which every heart was inspired to resist the disciplined pressure of the craven Peruvian hosts from the north, and partly to the salutary belief that their conduct was observed by the vigilant eye of their forefathers dwelling in the stars set in the blue skies above their land.

The Cultureless Zone

But beyond the narrow confines of these "Iroquois of the South," as they have been somewhat inaptly called, much of the land was wrapped in darkness and desolation, *homo homini lupus*—man a wolf to his fellowman—while head-hunting, cannibalism in exceedingly repulsive forms, brutal treatment of the women and children, prevailed to some extent both amongst the Amazonian and the Brazilian aborigines.

It is, however, right to say that, although for the most part living in a state of nature, many of the Amazonian natives were, and still are, amongst the noblest and most intelligent of all wild tribes. Hence the accounts given by some observers of extremely rude and savage customs must be taken as referring only to exceptionally debased groups, such as the Macus of the Rio Negro. These, we are told, have neither clothes nor houses, but only a few leaves stitched together as a shelter against the rain, yet have discovered a most deadly kind of poison for the arrowheads with which

they attack other natives and kill everybody in the captured villages. The Amajuacas of the Ucayali, near the old Peruvian frontier, have been over and again converted to Christianity, each time relapsing and murdering the evangelists. Even the Antis, who roam the woods near Cuzco, are described as fierce, cruel and untamable savages, if not cannibals. Yet they were closely associated with the Quichuas, and gave their name both to the *Andes* and to *Anti-suyu*, the eastern division of the empire. The Cashibos, also, of the Ucayali, eat their aged parents, we are asked to believe, more from religious sentiment than from cruelty. But religion has nothing to do with their habit of imitating the cry of game to decoy and, as is said, devour, hunters in the woods. Before their conversion it was the practice of the Cocomas of the Huallaga, but now removed to the Ucayali, to eat their dead relatives, and swallow the ground bones in fermented drinks, on the plea that it was better to be inside a warm friend than buried in the cold earth.

Worse things are related of the Tupinambas; the Tapuyas ("savages"); the Botocudos, who hack their refractory wives with sharp shells; and of some other extinct or still surviving natives of the Brazilian seaboard; of the Fuegians before the establishment of the English missions in their midst; and of others in Ecuador, Colombia, and the Orinoco basin.

Of monuments, in any intelligible sense of the term, there can be no question. The whole of this savage zone, over five million square miles in extent, and occupied by man since Pleistocene times, has nothing to remind us of the presence of man except some rude and infantile carvings, described by some enthusiasts as "rock inscriptions," met especially in the Guianas, Argentina,

and Brazil, and the so-called *piedras pintadas*, "painted rocks," which have a much wider range, occurring also in Argentina and in Chile. All are interesting, because of the resemblances and analogies they everywhere present both to each other, and also to similar tracings and sculptures in Arizona, New Mexico, and other parts of North America. When we consider that most of them fall far below the artistic skill of the African bushmen, and of the men of the first Stone Age in Europe, the suggestion may well be accepted that they were executed by some of the early immigrants from the north. The taste, or even the capacity to produce such carvings or paintings, crude as they are, may have afterwards been lost. At least they do not appear to be anywhere repeated or imitated by the present populations, who would almost seem to have fallen below the low standard of culture possessed by those early immigrants into the southern continent.

Many of these aborigines have not even reached the old Stone Age, for they cannot fashion a flint to any useful shape, and use no implements except shells, bones, thorns, and other materials supplied by nature. Others have never netted a hammock or launched a canoe, though dwelling on gently-flowing streams which seem designed expressly to foster the art of navigation. This picture of debasement is completed by one of the Chiquito tribes, who have the unique distinction of possessing absolutely no numeral system. The Australians and Papuans can all count at least up to *two;* but these Bolivians, under the shadow of the stupendous Tiahuanaco monuments on the shores of Titicaca, have never got beyond *zero*. The term *etáma*, said to mean *one*, really means "alone," "apart," so that their arithmetic is a blank.

The Civilised Zone

Thus while the wooded escarpments of the plateau continued to be the abode of rude wild tribes at the lowest rung of the social ladder, the plateau itself, treeless and bleak though it was, had long been the seat of a native culture capable of raising colossal monuments, elsewhere unrivalled for size and exquisite finish except in Egypt and Baalbec. These astonishing remains will have again to engage our attention, and here it must suffice to point out that they lie near the southern extremity of the cultural zone, beyond which all is savagery or barbarism. The much-discussed question of their origin can scarcely be treated apart from that of all the other pre-Columbian monuments, and other works of the more or less civilised communities, which stretch from this point in an unbroken iso-cultural line to the Colombian uplands. They are associated, going northwards, chiefly with the Bolivian "*Aymaras*" (properly Collas) and the allied Peruvian *Quichuas*, of whom the *Incas* were the dominant tribe, all these occupying the whole of the Andean plateau as far north as Quito (Ecuador); the nearly extinct *Yuncas* (*Chimus*) of the present Peruvian province of Trujillo; the people of *Ancon* on the same coast north of Lima, who, if not Quichuas, were at an early date brought under Quichua influences; lastly, the *Muyscas* (*Chibchas*) of the Cundinamarca plateau, Colombia, who are quite distinct in race, speech, and general culture from the Peruvians.

Excluding those of Ancon, who cannot in the present connection be separated from the Quichuas, all these peoples had, long before the advent of the Conquistadores, made considerable progress in the arts and industries, as well as in various social institutions, as is sufficiently

evident from the fact that they must be spoken of as *nations* in the strict sense of the term, and not merely as a bare aggregate of tribes, like the Mongolo-Turki hordes of Central Asia fortuitously brought together by some conquering Khans in vast but evanescent empires.. The empire of the Incas was marked by great stability, at least outwardly, and by a complete fusion of the ethnical and social elements over wide areas, though not everywhere. The same was, no doubt, true also of the other political systems, such as those of the Aymaras and Yuncas, which disappeared, not by internal disintegration, but by the spread of the Incas' sway over the Cordillera and Pacific seaboard, while the Muyscas, though torn by civil strife, held together till overthrown by the Spaniards.

Moreover, all these civilisations not only differed considerably from the Maya, the Aztec, and others of the northern continent, but also in many respects from each other. Characteristic of Chimu were the so-called huacas, huge sepulchral or other mounds, or truncated pyramids of a type somewhat analogous to those of Mexico, whereas the so-called mound of Ak-kapana at Tiahuanaco, which had been compared with those of Yucatan, is now shown to be a natural hill formerly crowned with buildings that have since disappeared. So also the Peruvian temples and other structures, as well as the great highways, terraced slopes, irrigation and other works carried out by the Incas, are of a different order from those of Central America.

It is further to be noted that the Aztecs, and especially the Mayas, had made considerable progress in the art of pictorial writing. Many of their symbols are now believed even to possess phonetic value, though still falling far short of a true alphabetic system. But of all this

no certain trace[1] has been found in the South, where even the Quichuas had no means of recording events, whether of an astronomical or an historical order, except by the so-called *quippos* or strings, a rude system of mnemonics still in use in some of the rural districts, the values of which are determined by the length, colour, knots, loops, and general arrangement of the strings.

Everywhere navigation was in a rudimentary state, the most advanced peoples being unacquainted with keeled vessels, or indeed with any craft beyond canoes and a kind of float or raft, on which a small sail might be hoisted in the calm waters of the Pacific coastlands, but useless for ordinary seafaring purposes. On the other hand, the land-connections were such as to exclude the suggestion of any large movements of invading hordes; nor were there any traditions or records of such movements among the people on either side of the isthmus of Panama, which had been reached only by one or two straggling Aztec groups from Nicaragua. This is one of the reasons why it is so difficult to accept the tradition that the founder of the Lambayeque dynasty in the Chimu territory came with his followers from the ocean on rafts. If to all these considerations be added the fact that the Aztec, Muysca, and Quichua-Aymara idioms were all stock languages with nothing in common except their general polysynthetic character, the inference seems irresistible that the cultured peoples north and south of the Panama

[1] Mention is made by Molina (1570-84) and others of pictures in the Inca country recording events, though none have been preserved. Some authorities think the carvings discovered in the Santa Maria Valley, province Catamarca, Argentina, constituted a writing system, even with phonetic characters, of Peruvian origin, but long extinct in the land of its birth. Yet even so, no support would thereby be lent to Maya-Aztec theories, for nobody pretends that such "inscriptions" have anything in common with the Central American systems.

region had for long ages remained practically isolated from each other. At least no regular communications had been established, no intercourse maintained beyond that of casual travellers or other visitors, which might suffice perhaps to account for such analogies as may be detected, for instance, between the Aztec or Peruvian pictorial art, as displayed in the decoration of the respective fictile vases, textiles or metal work.

It follows that the main features of all these cultural centres must have been independent local developments, and this is the conclusion which the latest and most careful observers have come to respecting the Tiahuanaco monuments, the most wonderful and original of all.[1] They were the work of the Aymara people, in whose territory they were raised in times prior to the conquest of the Titicaca basin by the Incas, who were consequently not the builders of these vast megalithic structures. The relations of the Incas to the conquered Aymaras will be dealt with further on.

[1] Stübel and Uhle, *Die Ruinenstätte von Tiahuanaco*, etc., Breslau, 1893, a sumptuous work, which deals exhaustively with the whole subject.

CHAPTER III

LATER ETHNICAL AND HISTORIC RELATIONS

The Discovery—Exploration of the Seaboard—Inland Expeditions—Orellana's Voyage down the Amazon—Relations of the Whites to the Aborigines—Miscegenation—Settlement of Brazil—The Negro Element—Mestizo Terminology—Spanish and Portuguese Colonial Administration—The Revolt—The Brazilian Empire and Republic—The Spanish South-American States.

The Discovery—Exploration of the Seaboard

SOMEWHERE about the year 1380 Chaucer wrote:—

> "Him nedeth not his colour for to dien
> With Brazil, ne with grain of Portingal."

Some now forgotten mystification has been caused by this apparently prophetic mention of the chief region of the southern continent, and in association too with the name of Portugal, its future master, quite 120 years before South America was sighted, and 170 years before any part of it was known by the name of Brazil. But the explanation is simple. The mention of Portugal in this connection is merely a curious coincidence, while the "Brazil" referred to by the poet is not a country but a dyewood, which was so named from its red flame colour,[1] and was well known to the Portuguese and other

[1] Cf. French *braise;* Eng. *brazier;* Port. *braza;* Ital. *brasile*, etc., all from a Teutonic root preserved in the Anglo-Saxon *brœsian*.

seafaring nations in the fourteenth century. Soon after the discovery a similar dyewood was found in abundance on the present Brazilian coastlands, which were thus named from it, and not the dyewood from the country.

No part of the southern mainland was reached till the year 1498, when Columbus visited the Orinoco delta

THE FIRST HOUSE ERECTED ON THE SPANISH MAIN, STILL EXISTING AT CARTAGENA.

and circumnavigated the island of Trinidad, which was so named by him in honour of the Trinity. He was followed in 1499 by Peralonso Niño and Cristobal Guerra, who coasted the Guiana seaboard for some distance westwards, and by Hojeda with his famous pilot Amerigo Vespucci, who completed the first rough survey of the low-lying Venezuelan coastlands for 600 miles to the Goajira Peninsula beyond the Maracaibo inlet. The

remainder of the northern seaboard was traced in 1500-1 by Bastidas de Sevilla all the way to the Gulf of Darien or Uraba, while Vicente Pinzon and Diego de Lepe passing southwards reached the Amazon estuary, penetrating round the island of Marajo into what they supposed was a great "fresh-water sea." Pushing still to the south Pinzon, rounding Cape S. Roque, easternmost headland of the continent, penetrated into the southern waters to Bahia, while Vespucci advanced in 1503 as far as the little inlet of Cananea, memorable as the starting-point of the first expedition to the interior, from which not a soul returned alive. The exploration of the eastern seaboard was completed as far as the Plate estuary in 1509 by Pinzon and Diaz de Solis. Returning in 1515, Solis made a more thorough survey of this great inlet, which was known as the Rio de Solis till 1528, when Sebastian Cabot, at that time in the Spanish service, finding that the Parana branch led towards the Peruvian silver mines, renamed it the Rio de la Plata, *i.e.* the "Silver River."

By the line drawn by Pope Alexander VI. in 1493, when he "sliced the world in two like an apple," assigning the western half to Spain and the eastern to Portugal, the latter power was very nearly excluded altogether from the southern continent. The line about coincided with the present meridian of 40° west of Greenwich, which intersects South America near its easternmost extremity not far from the S. Roque headland. But the very next year the parting line was, by the Treaty of Tordesillas, shifted considerably to the west, so that when this region was actually discovered the boundary was found by the Spaniards to run from a little west of the Amazon estuary southwards, and by the Portuguese to strike the mainland still farther west (60° or 61° W. Gr.), so as to leave the

whole of Guiana to the Orinoco delta on their side. The question never was and never could be settled, the proposed meridian having to be drawn 370 leagues west, not of any fixed point, but of an indefinable point in the Cape Verdes and Azores, which groups occupy wide but far from identical areas in the Atlantic.

But in any case a considerable slice of the southern mainland, however the treaty might be interpreted, necessarily fell to the share of the Portuguese. Hence it is all the more surprising that this rich "windfall" remained unknown to them, and unvisited by their navigators, till Pedro Alvarez Cabral, bound for the Cape and the East, was driven by a storm westwards to the Brazilian seaboard in the year 1500. Supposing the point where he struck land to be an island, he named it the *Ilha da Santa Cruz*—"Holy Rood Island," and gave the title of *Porto Seguro* to the haven where he had found refuge from the storm, and where he hoisted the Portuguese flag in the name of King Emmanuel. The "Harbour of Safety" still remains, while the imaginary island with its very name became merged in the vast region which, for the reason above stated, began about the middle of the sixteenth century to be known as the land of brazil-wood, or simply Brazil.

On the Pacific side the survey of the seaboard was naturally delayed till it became known that here also there was a seaboard, in other words, that America was an island, and not a part of the Asiatic mainland, more particularly of India, as persistently held by Columbus to the last. The delusion was dispelled by two memorable events—the actual discovery of the Pacific Ocean, first sighted by Vasco Nuñez de Balboa in 1513, and the opening of the inter-oceanic route by the voyage of Magellan through the strait named from him in the

year 1520. Owing to the east-west trend of the isthmus of Panama, Nuñez, crossing from the Caribbean Sea to the San Miguel inlet of the Gulf of Panama, looked out *southwards* on the boundless expanse, which he, therefore, called the "South Sea." Magellan, on the other hand, gave the name of "Pacific" to what proved to be the same oceanic basin, because he found himself in tranquil waters after weathering the stormy Fuegian channel. Since that time both expressions have been in constant use, and although Magellan's "Pacific Ocean" prevails amongst the nations of Romance and English speech, Nuñez' "South Sea" holds its ground in Teutonic lands. Even in English the expressions "South Sea Islands" and "South Sea Islanders" are more in favour when speaking of the countless Pacific insular groups and their inhabitants.

A beginning was made with the maritime exploration of the Pacific side of the southern continent in 1517, when Espinosa launched the first sailing vessel in Panama Bay, although his first trip was made, not southwards to Colombia or Peru, but round to the Nicoya inlet in Costa Rica. All the early voyages of discovery and conquest started from the Isthmian region, and although one of the ships detached by stress of weather from Loaysa's squadron in 1526 actually sailed from Fuegia to Tehuantepec (Mexico), it stood so far out to sea that the South American coast was not even sighted at any single point. Four years before this event, Andagoya had crept down the rugged Colombian seaboard to the mouth of a little river "Biru," the very position or identity of which appears to have never been determined. Yet its name, transformed by the Spaniards to *Peru*, has become associated with imperishable memories, and, by a not uncommon geographical misconception, has found a permanent "local habitation" as the designation

of one of the great political divisions of the southern continent. The reports of flourishing empires and boundless wealth, though not yet of *El Dorado* ("The Man of Gold") himself, brought back by Andagoya, gave the first impulse to Pizarro's scheme of conquest, which in fact began in 1524 with the formation of that renowned syndicate the "Biru Company," which, like the Roman triumvirates, consisted of three partners—Pizarro, Almagro, and Hernando de Luque.

Henceforth exploration and conquest go hand-in-hand both in Colombia and Peru, so that the work of coast survey need not here be followed in separate detail. It is curious to note in this connection that, for a long time, all geographical research was arrested at the Rio Maule, southern limit of the Incas' territory, and of the first military expeditions sent out in all directions by the Conquistadores. Even the coast-line was left undetermined till it was followed by Alonzo de Camargo from south to north (Fuegia to Callao) in 1540, and in the opposite direction by Sarmiento in 1579. The later and more accurate surveys of the southern fjords and archipelagoes were mostly carried out by Cook, Fitzroy, and other officers of the British Admiralty, although the terminal insular headland of Cape Horn (properly Hoorn) was first rounded in 1616 by the Dutch navigator, the name of whose native town it bears. With him was associated his fellow-countryman Jacob Lemaire, whose name is also perpetuated in Lemaire Strait between Fuegia proper and Staten Island.

Inland Expeditions—Early Voyages on the Amazons

Of the early inland expeditions, the most memorable is that of Gonzalo Pizarro, younger brother of the con-

queror of Peru, who left Quito to discover the land of cinnamon on Christmas day 1539. His party descended into the eastern forests, followed down the river Coca to its junction with the Napo, and built a small vessel in which to discover "the great river." Gonzalo sent his lieutenant, Francisco Orellana, to reconnoitre, but he basely deserted his chief. Thereupon Gonzalo and his followers after suffering terrible hardships, returned to Quito, while Orellana descended the great river and, reaching its mouth, sailed out of it in August 1541, finally arriving at the Spanish settlement of Cubagua. In one of the encounters on the river between the Spaniards and the natives, Orellana reported that he saw ten or twelve women fighting in front of the Indians. The Spaniards called them Amazons, and Father Carbajal, the historian of the voyage, described the female warriors. His work is lost, but the historian Herrera quoted from it, and the river received the name of Amazons.

In 1560 a second expedition under Pedro de Ursua descended the river Amazons, but his followers mutinied and murdered him, chose a desperate ruffian named Lope de Aguirre as their leader, and completed the voyage. It is a horrible story of rapine and cruelty, the mutineers being finally defeated at Burburata in Venezuela by the royal troops.

In 1637 two monks descended the Amazons to its mouth, and their arrival at Para induced the governor to despatch a Portuguese expedition up the river, under the command of Pedro de Texeira. The expedition was accompanied by the Jesuit Cristoval de Acuña, and Texeira reached Quito in 1638. The Jesuit Father observed everything on the way, noted down the names of Indian tribes, their manners and customs, the names of the rivers flowing into the Amazons, and the natural

productions of the country. Acuña's valuable work on the great river and the tribes on its banks was published at Madrid in 1641. The first descents of the river Amazons were thus made by Orellana in 1541, and Aguirre in 1561, and the first ascent by Texeira in 1638, Acuña being the first to publish a full description of the river and of the tribes inhabiting its banks.

Relations of the Whites to the Aborigines

Very great contrasts are everywhere conspicuous in the attitude of the white intruders towards the aborigines in the northern and southern continents. The differences, which must have a biding influence on the destinies of mankind in the western hemisphere, if not in the whole world, are not exclusively due to the various nationalities of the European settlers, as is so generally assumed by superficial or biassed observers. From the present consideration the Guianas, with their feeble white (British, Dutch, and French) population, may be excluded, as of no account, while Central America, including Mexico, must from this ethnical standpoint be transferred from the northern to the southern continent. We shall then have, for purposes of comparison, two sharply delimited ethnological and linguistic areas, to which the convenient if not quite accurate expressions "Anglo-Saxon" and "Latin America" have been applied. Here the term "Anglo-Saxon" is strained to cover, not only all the settlers from the British Isles, but also all other European immigrants (mainly of Teutonic stock), whose mother-tongue either is or must eventually be English. On the other hand, by "Latin America" is to be understood the whole region, as above defined, in which languages of

Latin origin—almost exclusively Spanish and Portuguese —are dominant.

In this broad statement alone expression is already given to fundamental differences. Thus in the north we have but one language, English, which is not merely "dominant," but practically the mother-tongue of the whole population, the only important exception being the French spoken by 1,650,000 Franco-Canadians in 1908. But the south is divided between two linguistic domains, while the language of each is scarcely anywhere the universal speech of all the inhabitants, but only of the dominant political section. In support of this statement it may suffice to mention the still wide range of Aztec and Maya-Quiché in Central America, of Quichua-Aymara in Peru and Bolivia, of Auca in South Chile, and of Tupi-Guarani in Brazil, Paraguay and Argentina, besides the continual spread of English on the seaboard, and of English, Italian, German and even Basque in the most progressive regions of Argentina, Uruguay and Brazil (Saõ Paulo, Rio Grande do Sul).

Miscegenation

Behind these differences lies a deeper, to which in fact they are due. If in the North English is or is becoming the mother-tongue of all, it is because there has been no fusion, or none to any serious extent, between the natives and the whites, but an absolute displacement of the former by the latter. At present there are practically no free tribes in the United States outside of Alaska, and but a few thousands in the Dominion, all the rest having been swept into reservations and agencies, where they have no power of expansion, that is, no future.

But in Latin America the relations are entirely different. Unlike the English "Pilgrim Fathers" and Virginian planters, the first Spaniards and Portuguese came admittedly as adventurers, soldiers of fortune, and treasure-seekers, unaccompanied by their womenkind and unencumbered by children. Some few in commanding positions returned for their families, and in the next century women accompanied the emigrants in considerable numbers. Many of the first conquerors, however, found it wiser for obvious reasons to settle down, and found new families by alliance with the natives. Nor could these natives be anywhere bodily displaced in the cultural zones, which even after the wholesale massacres, deportations, famines and other attendant horrors, remained still far too thickly peopled to allow of such summary processes as were possible amongst the scattered hunting tribes of the northern prairies.

In South Argentina and Uruguay, the conditions were not unlike those of the north, as seen by the many points of resemblance between the Uruguayan Charruas and the Pampas Indians on the one hand, and the Dakota and Algonquian nomads on the other. The result also has been the same—a clean sweep of Charruas and Pampas, for none of whom was there even time to prepare reservations, amid the storm and stress of modern social and industrial developments.

Settlement of Brazil

But the settlement of South Brazil, also a cultureless region, took place in earlier and less feverish times, consequently with quite different and, in some respects, surprising results, by which the whole current of history may be said to have been permanently influenced in

favour of the Portuguese rivals of the hitherto unchallenged Spanish supremacy.

Commissioned by King John III. to open up these southern districts, Martim Affonso de Souza founded in 1532 the station of Saô Vicente on the little coast-stream to which he gave the same name, and, at the same time "made an alliance with the Indians of the Carijo tribes called Goyana and Piratiningána." Then we are told that, some thirty years later, these colonists and their half-caste descendants already formed a numerous and energetic community, which sent out other settlers, founded the cities of Santo-André and São-Paulo, and "gradually spread over the continent." The population, it is expressly stated, continued to increase "through the alliance of the Europeans with the Indians; while their posterity, more active and enterprising than their maternal ancestors, were called *Mamelucos* and *Curibocas*." [1]

Later they became known by other names, *Vicentistas*, from the captaincy of São Vicente, and especially *Paulistas*, from the province of São Paulo, and these Paulistas soon spread the fame and terror of their name over half the continent. We shall meet them again, attacking aborigines, Spaniards, and the Jesuit missions with indiscriminate fury, opening up the mining districts, plunging fearlessly into the Brazilian backwoods, clearing the land for fresh settlements, pushing steadily forward, and extending the frontiers of the Portuguese domain right up to the slopes of the Cordillera. To the astonishing energy, daring, and enterprising spirit of these hardy pioneers is mainly due the fact that South America is at present partitioned, in nearly equal proportions, between the two dominant Latin peoples of Spanish and Portuguese speech.

[1] M. de Saint Adolphe, vol. ii. p. 600.

The Negro Element

As in other parts of Latin America, great numbers of the aborigines were captured by the Paulistas for the mines and plantations, but everywhere with much the same results. After thousands and tens of thousands had perished, without any adequate returns, they had to be replaced by Negro labour, and thus a fresh ethnical element was introduced into South as into North America. The Africans were imported into Venezuela, the Guianas, and especially the north-eastern provinces of Brazil and the Peruvian coastlands, mainly from Angola, Upper Guinea, and the other Portuguese possessions on the opposite side of the Atlantic.

The new relations thus created again presented the most marked contrasts in the Anglo-Saxon and Latin worlds. From the first the contact between the Virginia planters and the imported slaves was a one-sided affair, and since the emancipation has virtually ceased altogether. But in the south, and especially in Brazil, the blacks were received almost as equals by their half-caste employers, and in any case the only bar to their fusion in the general population was their social status. Race and colour never counted for much, so that even before the enfranchisement a strain of black blood was everywhere perceptible amongst the settled communities of Bahia, Ceara, Para, and surrounding provinces.

Thus it happens that while the whites have preserved their racial purity in the Southern United States, they have, at the same time, created a "Negro Question," to be dealt with by future philanthropists and statesmen. But there is no negro question in Latin America, where all the ethnical elements have from the first tended to be merged in a fresh division of mankind, which may

eventually acquire a uniform character, but must long continue to betray its diverse origins in the heterogeneous nature of its physical and mental qualities.

Mestizo Terminology

Such strides has miscegenation made along the Brazilian seaboard as far south as Bahia, that full-blood families, whether white, black, or native, are here rather the exception than the rule, at least in all the settled communities. Amongst the urban populations, the observer notices with amazement an endlessly diversified series of transitional types, for which the rich local nomenclature totally fails to find adequate expression. The confusion and perplexity are greatly increased by the different meanings attached in different parts of Latin America to some of the terms of this bewildering nomenclature, as shown by the subjoined list of the more important names in current use :—

Cabureto : Cross between Indian and Negress (Brazil).
Cafuso : Issue of Negro and Indian women (Brazil).
Curiboco : At first a white and Indian cross, now applied to various white, Indian, and Negro crosses (Brazil).
Casco : Direct issue of Mulattos on both sides (South America).
Chino : Negro and Indian cross (Spanish America).
Cholo : Issue of Zambos (South America).
Creole : Generally a full-blood white in Spanish America and West Indies ; full-blood black (Brazil) ; the issue of whites and Mestizos (Peru).
Mamaluco : Any cross, but especially white and Indian (Brazil).
Mestizo : Any half-breed, white and Negro, but especially white and Indian (Spanish America).
Mulatto : Any white and black cross, properly in the first generation, then all descendants of Mulattos.
Negro : Full-blood black, whether of African or American birth.
Octoroon : Issue of a Quadroon and white ; *i.e.* a white with a strain of one-sixteenth black blood.
Pardo : Same as Mulatto (Brazil) ; any half-breed (Argentina).

Quadroon } White with one-fourth black blood.
Quarteroon }

Quinteroon: White with one-eighth black blood.

Tapanhuna: Negro and Indian cross (Brazil, local).

Tente en el Ayre: Half-breed with predominant white element (Spanish America).

Xibaro: Same as Tapanhuna.

MESTIZOS OF QUINDIO.

Zambo: Any half-breed, but mostly Negro and Indian; in Peru and West Indies Negro and Mulatto; in St. Vincent the half-caste Caribs.

Zambo Preto: Issue of Negro and Zamba women (Spanish America).

The amalgam of all these elements must be regarded in the nature of a compromise in process of completion, but a compromise in which there would seem to have been a lowering of the higher without a corresponding

raising of the lower elements, except in a few instances, notably the Paulistas, the Paraguayans, and perhaps some of the Gauchos, developed under exceptionally favourable circumstances.

Spanish and Portuguese Colonial Administration

The Spanish colonial system was framed in the interests of the inhabitants quite as much as in those of the metropolis. But its admitted failure was owing to the local authorities, who generally disobeyed the orders from the central government, with the twofold object of gaining credit by sending home treasure, and of consulting their own interests. In fact, the colonial policy of all European nations was much the same before the nineteenth century, and consisted of oppressive monopolies and protective measures of all kinds, which had the threefold aim of inflating the State revenues, preventing the development of local industries that might compete with those of the home country, and excluding aliens from any share in the trade of the colonies. This policy was carried to extreme lengths by Spain, and when we read that all intercourse with the outer world was visited with severe penalties, we feel how justified is this summary description.

Nor did Portugal lag far behind, and so early as 1503 the Brazil wood, from which, as above seen, the country took its name, was declared a Royal monopoly; in the next century various corporations leased from the Crown the exclusive right of trading with Brazil, while an extraordinary decree was issued in 1701 forbidding all traffic between the northern and southern provinces. In 1715 the further development of the local rum distilleries was arrested in the interest of the importers

of brandies from Portugal, and these prohibitive measures culminated in 1785 with the suppression of all the weaving industries, those only excepted which provided the coarse cottons worn by the slaves.

Equally or even more disastrous was the ecclesiastical régime, which, by the introduction of the Inquisition and alliance with the civil power, maintained the outward supremacy of the Roman Church at the cost of true religion, manly feeling, and intellectual progress. Even material loss was caused by the expulsion or exclusion of the enterprising Jews and "heretics," a loss poorly compensated by the spread of a veneer of Christianity amongst the aborigines gathered round the Jesuit missions of the interior.

One result of the rigid patriarchal system introduced at these missions was to make the natives somewhat helpless in the struggle for existence after the suppression of the Jesuits by Pope Clement XIV. in 1773. When the missions were dispersed many of the congregations were destroyed by the more vigorous uncivilised tribes, and others relapsed into the wild state, while the survivors have merged in the general half-caste populations, whose religion consists of a verbal profession of misunderstood dogmatic teachings, blended with gross superstitions and coarse outward observances, conducted by a priesthood which was not distinguished by a high moral tone.

The Revolt

After the successful proclamation of the rights of man by the British North American colonists, revolution was in the air. The feeling of restlessness was intensified by the great upheaval in France, as well as by the

writings of Rousseau and the French encyclopedists. But the opportunity did not come till the opening of the nineteenth century, when legitimacy was overthrown by Napoleon in the Iberian Peninsula.

The Brazilian Empire and Republic

Events now took a twofold course in the southern continent, where the divided Hispano-Lusitanian rule made itself at once felt. The House of Bragança had always taken a special interest in its trans-Atlantic possessions, not only conferring the title of "Principality" on Brazil, but that of "Prince of Brazil" on the heir-presumptive to the Crown itself. Possibly, despite the shameful administrative abuses, a latent sentiment of loyalty may have thus been fostered, as it certainly had been in the principality of Wales by the like action of our Edward I. But in any case when the Prince Regent, after the occupation of Portugal by the French, took refuge in Brazil (1808), he was well received by all classes, and the devotion of the people to this dynasty was for a time strengthened by the wise policy which made the Brazilian seaports free to all nations, and in 1815 changed the title of Principality to that of "Kingdom."

But when the founder of this first hereditary monarchy in the New World returned to Lisbon in 1821, his eldest son Dom Pedro, who had been appointed Prince Regent, found himself compelled by the current of events to sever the connection with Portugal, and soon after constituted Brazil an independent empire, himself assuming the Imperial Purple in Rio de Janeiro on 12th October 1822. Thus was brought about the independency of the "Greater Portugal" by the peaceful process of segmentation, just as in our days the empire itself was

transformed to a Federal Republic, under the title of The United States of Brazil, also by a bloodless revolution (November 1889).

The Spanish South American States

Apart from some mutterings and menaces in the half-Spanish district of Rio Grande do Sul, it is noteworthy that these happy solutions of high political problems have at all times been followed by the maintenance of peace and orderly government throughout the vast confines of Empire and Republic. Herein the contrast is complete between the Portuguese and the Spanish domains. In the latter the wars of independence, fought out bravely on both sides, have been followed almost everywhere by far more disastrous fratricidal wars, by incessant strife within each separate state, with an expenditure of blood and treasure out of all proportion to the interests involved.

The dreams of some of the revolutionary leaders to replace the old Spanish vice-royalties by a united Spanish South America, whether on the principle of federation or otherwise, were quickly dispelled, and indeed shown to be impracticable on many grounds that need not here be discussed. The very lie of the land, mostly confined to the Andean plateaux, and at that time almost destitute of inter-communications, of itself excluded the idea of any such political unity. Hence after the removal of the fictitious bond of unity supplied by the suzerainty of Spain, the whole region was, so to say, dissolved into its primeval elements, and reconstituted as a sort of South American "Heptarchy," in which the chief bonds of union were and are the Spanish language, everywhere the common speech of the ruling classes, and the

republican form of government, generally modelled on that of North America.

Despite the political convulsions, which happily seem to show symptoms of exhaustion, a considerable measure of material progress has almost everywhere been made, as seen in the marked increase of population, in the spread of general comfort, the improvement of the communications, the growth of trade, and the development of the immense natural resources of the land. In some places, notably South Brazil, Uruguay, Chile, and the central states of Argentina, the progress in all these and other respects has been prodigious.

All these regions, representing about 2,000,000 square miles, lie fairly within the temperate zone, and are in every way the most suitable for European settlement. Hence for many years a stream of emigration has set steadily in this direction from the Spanish and French Basque Provinces, from Italy, Germany, the British Isles, and even Russia, this contingency being chiefly Jews driven into exile by the persecuting spirit still rampant in that empire. Hitherto the several communities have kept much apart, and as all are free to educate their children in their own way, a long time must elapse before they are merged in a homogeneous community of one speech, inspired by a common national sentiment. From this community are definitely excluded both the aboriginal and the black elements. Consequently it must ultimately constitute a compact mass of pure European stock, reckoned by many millions, which cannot fail to exercise a controlling, if not a dominant, influence over the destinies of the southern continent.

Subjoined is a table of all the South American States, with their respective areas, populations, capitals, and other details.

States.	Area in sq. m.	Population.	Revenue.	Debt.	Capital.
Venezuela	364,000	2,619,000 (1906)	£1,772,000 (1907)	£9,240,000 (1907)	Caracas.
Colombia	490,000	4,280,000 (1903)	£3,100,000 (1907)	£3,037,000 (1905)	Bogotá.
Panama (since 1903)	33,800	400,000 (1908)	£973,000 (1908)	...	Panama.
Ecuador	116,000	1,206,000 (1907)	£1,400,000 (1907)	£1,030,000 (1907)	Quito.
Peru .	696,000	3,000,000 (est. 1907)	£2,680,000 (1907)	£23,600,000 (1886)[1]	Lima.
Bolivia .	605,000	1,954,000 (est. 1906)	£1,300,000 (1907)	...	Sucre.
Chile .	307,620	3,400,000 (1906)	£6,800,000 (1905)	£21,000,000 (1906)	Santiago.
Argentina	1,136,000	5,678,000	£12,050,000 (1907)	£83,553,000 (1907)	Buenos Ayres.
Uruguay	72,210	1,103,000 (1906)	£5,060,000 (1908)	£27,000,000 (1906)	Monte Video.
Paraguay	98,000	632,000 (1905)	£5,130,000 (1907)	£846,000 (1907)	Asuncion.
Brazil .	3,219,000	17,371,000 (1900)	£11,700,000 (1907)	£69,608,000 (1907)	Rio de Janeiro.

[1] In 1889 this debt was cancelled by the bond-holders in exchange for certain concessions to the Peruvian Corporation.

CHAPTER IV

VENEZUELA

Extent—Boundaries—Disputed Frontiers—Physical Features—General Relief—Northern Uplands—Sierra de Merida—Coast Range—Cordillera de la Silla—The Southern Uplands: Sierras Parima and Pacaraima—Earthquakes—Igneous Phenomena—The Venezuelan Llanos—Scenery of the Llanos—Hydrography—Lake Maracaibo—Lake of Valencia—The Orinoco Basin—The Delta—Orinoco Scenery—Gulf of Paria—Climate—Flora—Fauna—Inhabitants—The Aborigines—Europeans and Mestizos—Prospects of Immigrants—Historic Retrospect—Topography—Chief Towns—Government—Social Condition.

Extent—Boundaries—Disputed Frontiers

After the expulsion of the Spaniards the newly-formed states set about determining their respective frontiers on the *uti possidetis* principle of the Spanish government in 1810. But a little consideration will show that difficulties were inevitable, and were not solely due to the greed or ambition of the rival republics. In fact they were largely caused by the character of the territories which had to be delimited. They comprised two distinct geographical groups—the strictly lowland states of Argentina, Paraguay, and Uruguay, and the highland states of Venezuela, New Grenada (Colombia), Ecuador, Peru, Bolivia, and Chile. But between the two groups there were no well-marked natural frontiers, so that collisions and complications became inevitable, when one group sought to broaden their boundaries down the slopes to the plains, while the other, or at least Argentina, endeavoured to creep as far up the escarpments of the plateaux as possible.

Throughout the nineteenth century Venezuela has had frontier difficulties with all her neighbours — Colombia on the west, Brazil on the south, and England, as heir to the western section of Dutch Guiana, on the east. The last, by far the most serious, threatened for a moment to cause a rupture between the two powers, but was referred in 1896 to the Government of the United States, at whose suggestion four arbitrators (two for Great Britain and two for Venezuela), with a president, were appointed to inquire into the whole question at issue, the decision of the majority to be final. The point at issue concerned a small but important strip of coastland just east of the Orinoco delta, the surrender of which by England would exclude British Guiana from all access by land to the Lower Orinoco basin. From a paper on the subject, contributed by Sir Cl. Markham to the *Geographical Journal* for March 1896, it appears that England's right to this district, watered by the Barama and Barima coast-streams, is indefeasible on the solid grounds of history, exploration, and effective occupation. Venezuela claimed solely through Spain,[1] which, as shown by the old maps and other data, never at any time occupied the coastlands east of the delta, these being described as "Caribana," that is, the independent territory of the Caribs. But England claimed partly through the Dutch, who were in alliance with these very Caribs; partly through geographical research, especially that of Sir R. H. Schomburgk (1835-45), whose frontier line includes the strip in

[1] At least the absurd claim based on Pope Alexander's Bull was not seriously entertained by the court. The original line of 1493, which alone had Papal sanction, was superseded by that of 1494, which has never been determined (see above). A less shadowy claim might have been based by England on a map in the Spanish archives, dated 1591, with the legend over an island in the delta: "Aqui estan los Ingleses," that is, "Here are the English."

question, and could scarcely be seriously challenged. Hence the Court of Arbitration, by its final award (October 1899), upheld this line except in two places —Barima Point with the lower course of the Barima river, which is assigned to Venezuela; and farther inland, where the boundary, instead of following the Cuyuni river to its head, ascends its Wenamu tributary, thus leaving the Cuyuni goldfields to Venezuela.

It is not without interest to note that certain documents of the eighteenth century preserved in the archives of the Capuchin Friars at Rome show the whole seaboard between the Orinoco and the Essequibo in possession of the Dutch.

Towards Colombia the frontier, referred for settlement to Spain, was laid down in 1891 rather to the advantage of the western republic, to which was left most of the Goajira Peninsula, besides the San Faustino district in the Rio Zulia valley, and the left side of the Upper Orinoco between the Meta and Guaviare affluents. Farther south the line of demarcation coincides with the Rio Atabapo to about 20 miles above Yavita, beyond which it runs due south across several other Orinoco affluents to the Guainia headstream of the Rio Negro, which is then followed to the Brazilian frontier at Cucahy. Here the line, as agreed to by treaty with Brazil in 1859, runs east, north, and again east, to British Guiana near Roraima, at first following the crest of the divide between the Baria and Cauaburi tributaries of the Rio Negro, and coinciding farther east with the Sierra de Parima, that is, the water-parting between the streams flowing north to the Orinoco and through the Rio Branco south to the Amazon. These are, at all events to a large extent, natural frontiers, which have the effect of leaving nearly the whole of the Orinoco basin to Venezuela.

The coastlands from the Orinoco delta to the Goajira Peninsula, together with the adjacent islets of Cubagua, Margarita, Tortuga, Orchilla, and Aves, form part of the republic, which thus delimited comprises an area approximately estimated at 364,000 square miles, with scarcely a third of the population of Belgium. But Venezuela consists for the most part of an almost uninhabited wilderness of uplands and llanos (plains), which were but little known beyond the settled districts before the explorations of Dr. W. Sievers in 1885 and again in 1892-93.

The republic comprises a Federal District, 13 States, and 5 Territories, with populations (1905) as under :—

States, etc. :—	Population.
Federal District	210,043
Aragua	152,516
Bermúdez	365,766
Bolivar	57,229
Carabobo	222,196
Falcón	174,410
Guárico	79,077
Lara	274,720
Mérida	123,350
Miranda	143,847
Táchira	138,118
Trujillo	136,672
Zamora	223,872
Zulia	174,843
Territories :—	
Amazonas, Colón, Cristóbal Colón, Delta-Aracuro, Yuruari	92,559
Total	2,619,218

Of this scanty population, which, however, shows an increase of nearly 300,000 over that of the census for 1891, as many as 326,000 were returned in 1891 as full-blood Indians, and of these 66,000 were still absolutely independent, 20,000 reduced, but living in the tribal state, and 240,000 civilised, that is, occupying permanent settlements like the general population, but still speaking their original mother-tongues, chiefly dialects of the Barré, Carib, and Arawak stock languages. Apart from a small but unknown percentage of pure white descent, the rest of the inhabitants may be broadly described as more or less civilised but turbulent Hispano-American Mestizos of Spanish speech. There is, however, a strain of black blood perceptible, especially in the seaports, due to the 50,000 Negroes and Mulattos emancipated in 1830, and since then absorbed in the general population.

Physical Features—General Relief

Were the north equatorial section of the continent again flooded to a depth of a few hundred feet by the old inland sea, the general configuration of the Venezuelan region would stand out in bold relief. The marine waters, covering about 200,000 square miles of the present Orinoco basin, would be enclosed on the west and north by a mountain system rooted in the Colombian Andes, and sweeping in a gentle curve round to its eastern extremity at the island of Trinidad. This system, which consists, like the Andes generally, of a coast range—the Sierra de Mar, and an inland range—the Sierra de Merida, with its eastern extensions—would be seen projecting in a continuous or nearly unbroken line between the Caribbean and the Inland Sea, while the latter would encircle towards the south-east another

upland region extending eastwards through the Guianas to the Atlantic.

These uplands, like those of Brazil, from which they are now separated by the Amazon valley, but with which they would appear to be geologically connected, comprise within Venezuelan territory the Sierra de Parima (Parime), Pacaraima, and other ridges and plateaux of very irregular outline, but forming a complete divide between the Lower Amazon and Orinoco basins, as the northern system does between the Orinoco and the Caribbean Sea. Venezuela is thus seen to consist of three distinct geographical regions, whose respective areas may be approximately estimated as under :—

	Area in sq. miles.
Central lowlands, *i.e.*, the Orinoco llanos or plains in their widest extent	200,000
Northern uplands : coast and inland ranges . .	70,000
South-eastern uplands	95,000
Total . .	365,000

Northern Uplands—Sierra de Merida—Coast Range

Hitherto the northern system has been commonly regarded as an eastern extension of the Cordillera de los Andes, to which at the southern extremity of the continent would correspond another eastern but submarine extension running from Fuegia to South Georgia. But all such geographical parallelisms, so much in favour with the ancients, have generally had to yield to modern scientific inquiry, and Dr. Sievers now contests the views of the older geologists regarding the homogeneous Andean character of the north Venezuelan system taken as a whole. It is argued with much force that the term Andes should be restricted, as it is in popular use, to the Sierra de Merida, which properly terminates eastwards

at a pass 1190 feet high leading from the basin of the Yaracui coast-stream to that of the Cojedes, which drains to the Orinoco through the Rios Portuguesa and Apure. This gap would appear to separate two absolutely distinct orographic systems—that of the Cordillera to the west, and to the east the "Carib Mountains," that is, the coast range, which is much older (gneiss, mica-schists and metamorphic rocks) and belongs rather to the now mostly submerged or denuded chains of the Antilles. Nevertheless it cannot be denied that from the purely geographical point of view the coast range forms a regular extension of the Colombian Andes.

Of all the Venezuelan ranges the *Sierra de Merida* is by far the most elevated. It alone claims the title of *Nevada*, "snowy," thanks to four or five of its peaks which rise above the snow-line. Such are the Concha and Coluna, south-east of Merida, both 15,416 feet high, while Concha boasts even of a little glacier, which supplies Merida with ice. As everywhere in the Andes, the Merida highlands develop two or more parallel ridges, connected by transverse chains of older formation—crystalline rocks and schists of great age. The upland plateaux enclosed by these lofty ramparts, and standing over 11,000 feet above sea-level, take the name of *parimos*—bleak, treeless plains, swept by keen blasts or wrapped in frozen vapour, and generally presenting an Arctic climate within a few degrees of the equator. Towards the north the steep cretaceous slopes fall abruptly down to the narrow strip of woodland separating them from the Maracaibo lagoon, and here a distinct divide is formed between the torrents rushing down to the lagoon and the streams flowing with a less rapid course to the Apure affluent of the Orinoco.

Cordillera de la Silla

East of the Merida highlands follows the *Cordillera de la Silla*, the "Saddle Range," which terminates somewhat abruptly at Cape Codera. Like some sections of the Peruvian Andes, the Silla presents exceedingly steep rocky walls to the sea, leaving no beach or inlet except the little haven of Guaira, and almost everywhere rising abruptly from the marine depths to a mean altitude of about 5000 feet. The almost vertical sides of *Naiguata*, the culminating peak (9130 feet), were for the first time scaled by Spence and Ernest in 1874. The *Silla*, which gives its name to the system, is only about 370 feet lower; yet it was near this peak that the difficult track formerly led over the range from Caracas on the southern slope down to the port of Guaira.

Beyond the Silla the Sierra de Mar is continued through the much less elevated Cumana (Cariaco) and Paria ranges to its termination at the Gulf of Paria over against Trinidad, which undoubtedly belongs to the same system. The Paria section, which culminates in a peak 3510 feet high, runs for a distance of 170 miles between the Paria and Cariaco inlets, and is entirely of igneous origin. It has no apparent connection with the rest of the system, and its existence may be associated with the formation of the Gulf of Cariaco, which was due to a submarine convulsion said to have occurred not long before the discovery.

The Southern Uplands: Sierras Parima and Pacaraima

Although the southern uplands cover a far more extensive space, they nowhere attain the altitude of the northern highlands; nor do they anywhere develop such

sharply defined mountain ranges. To the whole system is commonly extended the expression Sierra Parima, in reference to the mythical Lake Parima, that is "Great Water," where dwelt El Dorado in a golden palace glittering with precious stones, and whither Raleigh and so many other adventurers went in quest of his fabulous treasures. But the sierra might seem to be almost as mythical as the lake. The whole region, which still awaits careful exploration, would seem to have the aspect of a vast turtle-back plateau, sloping north to the Orinoco and south to the Amazon, traversed by no great mountain ranges anywhere, but crossed in various directions by short ridges, and presenting steep escarpments rather than true ranges towards the Amazonian plains. These escarpments, that is, the Sierra Parima, with its eastern extension the Sierra Pacaraima, were not even visited by the Commission appointed to lay down the Brazilo-Venezuelan frontier line along their crest in 1880-83. They appear to consist of a granite core underlying old sandstone strata, and even their highest peaks probably fall below 6500 feet, while those about the sources of the Orinoco affluents are estimated by Chaffanjon at not more than 4000 or 4500 feet. The *Sierra de Mato*, one of the northern ridges running close to the right bank of the Orinoco, rises in a peak measured by Codazzi to a height of 6170 feet, and in its upper course the main stream is dominated by the *Cerro Duida* (8120 feet), a most conspicuous landmark, visible for a great distance up and down the river and indicating the point where the Cassiquiare branches off towards the Amazon basin. But this pyramidal bluff is exceeded by the neighbouring *Sierra Maraguaca* (8230 feet), which was long regarded as the culminating point of the south-east Venezuelan uplands. But this honour must now be

transferred to *Mount Icutu*, highest dome of the lofty Sierra Guamapi, which was first approached in 1897 by Major Stanley Paterson,[1] and estimated by him at 11,000 feet. Icutu, which with its rapidly sloping sides and bulging summit, presents somewhat the aspect of a gigantic toad-stool, stands near the source of the Cuchivero, a small stream flowing north to the right bank of the Orinoco below the Apure confluence.

Earthquakes—Igneous Phenomena

Although Venezuela is literally an unstable land, subject to frequent and violent underground disturbances, one of which destroyed Caracas with 12,000 of its inhabitants in 1812, there is not a single active volcano in the whole region. But indications of former eruptions are seen in the lavas and scoriæ of San Juan de los Morros on the southern slope of the Sierra de Mar. At one time it was supposed that burning mountains existed in many places. But the flickering flames that gave rise to the belief are now known to be in no way connected with such igneous displays. They are, however, a sufficiently remarkable phenomenon of the class popularly known as will-o'-the-wisps, of more frequent occurrence and more widely diffused than in any other part of the world. These curious but harmless inflammable vapours are seen dancing about at night in every part of the country, on lowlands and uplands alike, on the flanks of Duida and of Cuchimano near Cumana, as well as on the marshy banks of the Catatumbo and other streams flowing to Lake Maracaibo. On the llanos they flare up amid the tall grasses without burning them, and they probably indicate the presence of immense stores of gases

[1] *Geogr. Jour.* (January 1899), p. 39 *sq.*

and naphtha reserved for future use. At least the pitchy substances oozing up in the Orinoco delta and elsewhere seem to be associated with the famous bituminous lake of Trinidad, and to point like it to vast underground reservoirs of asphalt.

The Venezuelan Llanos

From the southern slopes of the northern uplands the central plains stretch away to the Guiana forest tracts beyond the Orinoco delta, and occupy the whole region between the Sierra de Merida and the northern slopes of the Parima uplands. Following the trend of the old marine basin, they sweep like a great arm of the sea round the western escarpments of these heights, and here merge southwards in the Amazonian plains. The llanos are thus largely conterminous with the lower level of the Orinoco basin, although the expression is generally restricted to the region bounded by the left bank of that river. Even in this limited sense, they are far from corresponding everywhere with the popular idea of a vast level or slightly undulating treeless or grassy plain, like the North American prairies or the Argentine pampas. Even after escaping from the higher uplands, the Apure, Meta, Vichada, Guaviare, and other north-western affluents of the Orinoco, have a fairly rapid course, obstructed in some places by rapids, thus showing a gradual rise from the bed of the main stream towards the Colombian and Venezuelan highlands. This rise above the former level of the old marine basin represents a portion of the sedimentary matter washed down by the running waters, and may therefore be regarded as the talus of the encirling Cordilleras. Hence the local expressions *llanos altos*, "upper plains," and *llanos bajos*, "lower

plains," the latter representing the old bed of the inland sea, and still standing at a mean elevation of scarcely more than 300 feet above its level. Everywhere the llanos altos present an agreeably diversified aspect, with much broken ground, watered by the upper courses of the Orinoco affluents, and clothed in some districts with a rich tropical vegetation.

"Tens of thousands of square miles of this region are yearly inundated and enriched by the rivers which overflow their banks. Like the Beni and Mojos plain of Bolivia, it seems an unfinished country, the mountains not yet having sent enough material to the llanos to keep them out of water during the entire year. It is a land of extremes, the wet season terribly wet, and the dry one intensely dry. The lower llanos are healthy during the dry season of about seven months' duration, but the marshes are pestiferous at all times" (Col. Church).

Scenery of the Llanos

But even the llanos properly so called have their attractions. From the higher slopes a prospect is commanded of one of the grandest scenes in nature. At your feet lies a lovely expanse of meadow, fresh and smooth as the best-trimmed lawn, with troops of horses and countless herds of cattle dispersed over the plains. Here and there the eye alights on glittering pools or lakelets left by the last rains, and now alive with an immense variety of aquatic birds. As far as the gaze can reach, the undulating grassy plain appears like a shoreless ocean petrified after a storm. No language could convey a true picture of the varied beauties of the scene—the harmonious effects of light and shade; the

blending of the various green, blue, and purple tints flitting in the sunlight over the vast panorama; the stately palms gracefully fanning the glowing atmosphere, with their majestic crowns of broad and shining foliage.

Conspicuous especially is the *Copernicia tectorum*, as valuable as it is beautiful, with as many names as the uses to which it is put. To the stock-breeders and settlers it is known as the *palma de cobija*, the "thatch palm," because its leaves serve to thatch their farmsteads; it is the *palma de sombrero*, the "hat palm" of the straw-hat makers; and by wayfarers it is termed the *palma de abanico*, the "fan-palm," being so used by them against the flies during their wanderings over the steppe. Still more beautiful is the *Saman*, a species of mimosa, which grows profusely along the banks of the Apure and other streams, spreading its delicate feathery foliage aloft, like a dainty parasol. Extensive tracts are overgrown with this graceful tree, which we are told might supply sufficient material for the reconstruction of all the fleets of the world.

More characteristic of the llanos proper are the grasses, often more curious than valuable. Such is the worthless *gamelote*, tall and sharp as a Toledo blade, but useless even as fodder. In the Apure district is seen the singular phenomenon of the *medanos* or ranges of low dunes, formed by the loose sand drifting before the wind over the boundless plain. They are continually shifting their form, rising at one time well above the surface, at another dispersed as fine dust over the steppe. But in one district, where they have been bound fast by the roots of the gamelote, they have been transformed to a low range of permanent hills the so-called Medanos del San Martin. Some of the grasses are soft and pliable as silk, and it is owing to their nutritious qualities that the

alluvial plains of the Apure and its tributaries have become so noted for stock-breeding.

Hydrography—Lake Maracaibo

On the rock-bound north coast there is no room for the development of fluvial basins. Hence between the Goajira Peninsula and the Gulf of Paria there is only one navigable watercourse—the Catatumbo—all the rest being mere torrents or insignificant coast-streams, which find their way in independent channels to Lake Maracaibo and the Carribean Sea. From the precipitous slopes of the encircling Cordilleras Maracaibo receives several such streams, whose deposits are slowly filling in this extensive but shallow inlet. The most copious is the Catatumbo, which, besides the Orinoco, is the only river in Venezuela used for navigation. The main channel with its Zulia affluent is accessible to small steamers throughout the year; but its basin belongs in part only to Venezeula, its head-waters having their source in the Santander uplands, Colombia. In fact, it is through its upper valley that the Colombians gain access to Maracaibo.

This marine inlet, the largest in the southern continent, is rather in the nature of a lake or lagoon than of a gulf, being so far landlocked that the tides are scarcely felt inside the bar. A little way beyond this bar its waters are quite fresh, the supplies it receives from the surrounding streams being greatly in excess of the marine currents. The "Sack of Venezuela," as it is called, has a circuit of 370 miles, with an area of 9000 square miles, and an extreme depth of 500 feet, but shoaling rapidly towards the Mochila or inner basin.

The outer and much larger basin was formerly known

as the Gulf of Venice, a name connected with that of the republic itself. When Hojeda and Vespucci first navigated its waters in 1499 they noticed on its shelving margin one of those aquatic stations, or groups of pile dwellings, which are met so frequently in similar localities in Malaysia, New Guinea, and other parts of the world. The waterways between the rows of houses, with the "gondolas" (canoes) moored to the posts, were so suggestive of Venice that the place was named *Venezuela*, "little Venice," while the inlet for a time bore the name of Venice itself. From this aquatic station the sonorous term Venezuela spread to the whole region. The case is exactly parallel to that of Brunei, where are also to be seen such pile-dwellings, and the name of which, since the first visit of Magellan's associate Pigafetta, has been extended to the whole island of Borneo.

Lake of Valencia

Besides the Maracaibo lagoon Venezuela possesses at least one real fresh-water basin—the Lake of Valencia, which fills a great part of the rich Aragua valley, and is one of the most remarkable sheets of water in the world. Although it seems completely encircled by the coast and inland ranges, Lake Tacarigua, as it is called by the natives, has two different outlets on the west side close to the city of Valencia. By one of these emissaries it has occasionally sent its overflow through the Trincheras northwards to the Agua Caliente affluent of the Caribbean Sea, and by the other it has communicated several times through the Paito southwards with the Pao tributary of the Orinoco. According to the oscillations of level, the Caño Camburi, that is, the southern emissary, has thus been alternately an affluent and an effluent of this erratic

lacustrine basin. Its waters, which have become slightly brackish, and have an extreme depth of 300 feet, had been steadily subsiding for some years before 1882; but since that time the lake appears to have again acquired some measure of stability, and is even said to be now rising to its former high level, when it discharged to the Orinoco.

The Orinoco Basin

The Orinoco is one of the great rivers of the world, being exceeded in volume only by the Amazon and Parana in South America, and elsewhere by the Mississippi, St. Lawrence, Congo, Niger, Yang-tse, and Brahmaputra. But several others surpass it in length, for although it draws contributions from the eastern slopes of the Colombian Cordillera, its course lies nearly ten degrees north of the equator, where the width of the continent is greatly contracted by the rapidly receding contour-line of the Guianas. Thus the Orinoco delta stands about twelve degrees of longitude west of the Amazon estuary, which to some extent is a measure of the different lengths of the two main streams.

But the farthest head-waters of the Orinoco, or Orinucu, the form given by its first explorer, Diego de Ordaz in 1531, lie not in the Colombian Cordillera nor in the Sierra de Merida, but in the Parima uplands, where its source was discovered by Chaffanjon in a rivulet above the *Salto de los Franceses*, at no great distance from the Cassiquiare confluence. The channel of this stream, which forms the connecting link between the Amazon and Orinoco systems, is continued southwards through another stream, which again ramifies into the Baria and Canaburi, both affluents of the Rio Negro. At the junction of the Cassiquiare, which sends only about a third

of its current to the Orinoco, the bed of the main stream stands not more than 920 feet above sea-level. Thus the absolute fall from this point to the delta, a distance of about 1300 miles, is less than 9 inches per mile, so that by the removal of a few obstructions here and there the main stream, with many of its ramifications, would be accessible for light craft to the foot of the Cordillera, and through the Cassiquiare to the heart of the continent. Yet these magnificent inland waters are at present (1908) utilised in a regular way only by one or two steamers of the Royal Mail Steamship Company, plying once a fortnight between Trinidad and Ciudad Bolivar. So gentle is the current to this point that the voyage up-stream takes only six hours more than the return trip—36 and 30 hours respectively. During the rainy season, from May to November, smaller steamers continue the service from Bolivar to Nutrias on the Middle Apure. But beyond Caicara, at the Apure confluence, there is no regular navigation at all, although steamers ascend as occasion requires to various stations below the Apure rapids.

Beyond the Cassiquiare junction the main stream, keeping close to the Parima escarpments and in some places even forcing its way through the projecting spurs, trends north by west, north, and north by east to the Apure confluence, where it bends round to the east for the rest of its course to the delta. Between the Cassiquiare and the Apure it receives only one notable contribution on the right—the Ventuari—from the Parima uplands. But on its left bank it is joined by several important affluents, such as the Guainia, the Guaviare, Meta, and Arauca, all descending from the Colombian Cordillera, and traversing the llanos in nearly parallel south-easterly valleys. The Guaviare, which is

navigable for small steamers for about 600 miles to the Ari-Ari ford, rolls down a volume of no less than 112,000 cubic feet per second during the floods.

Between the Guaviare and Meta confluences are developed the romantic Maypures and the Atures rapids, which are the only serious obstructions of this nature throughout the whole course of the main stream, and are caused, not by any general rise in the fluvial valley, but only by the projecting Parima heights, which are here and there cut right through instead of being turned by a bend to the west. The Atures rapids, about 6 miles long with a total fall of 30 feet, are indicated from a distance by two notable bluffs, the *Cerro Pintado*, "Painted Hill," and the *Cerro de los Muertos*, "Dead Men's Hill," the former so called from the rude figures with which they are covered, the latter from the sepulchral chambers in its cavernous recesses. Jointly the two cataracts represent a total fall of not more than 70 feet, but present an insurmountable obstacle to the navigation even at high water.

The Meta, which debouches below the Ature falls, is even a more important tributary than the Guaviare. Drawing its supplies through numerous branches from the Cordillera on the upper llanos, it expands at times to a width of nearly a mile, and would be navigable for large vessels but for the sandbanks obstructing the channel at various points. As it is, steamers drawing 8 or 10 feet ascend about a third of its course during the floods, when it discharges a volume estimated at 160,000 cubic feet per second.

Beyond the Arauca follows the Apure, the typical river of the llanos, joining from the west and consequently continuing the main axis of the Orinoco valley from its delta right up to the Colombian Andes. Hence, in a

hydrographic sense, many geographers have regarded the Apure as the true upper course of the Orinoco. Even from the standpoint of navigable length, if not of volume, it might still claim to hold this position, because the navigation of the main stream is arrested at the Atures rapids, whereas no serious obstructions interrupt the placid course of the Apure below the confluence of its two main branches—the Sarare and Uribante. Its drainage area extends up the slopes both of the Colombian and Venezuelan Andes, and develops a vast inland delta which mingles its lateral channels with the neighbouring Arauca, and during the floods covers a space 6 or 7 miles in extent.

About midway between this and the marine delta, the old town of Angostura, the "Narrows," now renamed Ciudad Bolivar in honour of the "Liberator," marks the head of the tidal waters at a distance of 260 miles from the sea. At this point the mean discharge per second is estimated by Orton at 500,000 cubic feet, while the depth of the lower reaches in many places exceeds 180 feet. But the German warship *Panther*, which ascended the Lower Orinoco in 1903, found that at Bolivar the difference between high and low water was little more than 23 feet. From January to March no depths over 10 feet can be depended upon, and vessels drawing as much water as the *Panther*, say 15 feet, cannot navigate the river at all after December during the dry season, or till about the middle of April.

The Delta

As it approaches the sea the main current continues its easterly course in a straight line to Barima Point, without throwing off any important branches to the right, that is, to the conterminous district of British Guiana, or

higher up. Thus the whole of the deltaic region is developed toward the north, and in fact, with a front of about 430 miles, occupies all the space between the Boca de Navios, "Ships' Mouth," and the Gulf of Paria. It is divided into the Lower or Southern, and Upper or Northern Delta, by the Macaros, another navigable branch, which presents the shortest route from Trinidad to the interior, and is consequently utilised by the steamers plying between Port of Spain and Ciudad Bolivar. The delta has a total area of 7000 square miles, and is intersected by as many as fifty channels flowing directly to the sea; but of these many frequently shift their beds, and not more than seven are permanently navigable by large vessels.

Subjoined are approximate estimates of the chief features of the Orinoco basin, viewed as a whole:—

Drainage area	364,000 sq. miles.
Length	1,450 miles.
Length of navigable waters	4,300 ,,
Discharge per second at low water	238,000 cubic feet.
,, ,, ,, at high water	875,000 ,, ,,
Mean discharge per second	500,000 ,, ,,
Mean annual rainfall	76 inches.

Orinoco Scenery

The banks of the Orinoco are fringed along its many windings by magnificent forest trees, which project their shadows far across the stream on both sides. During the rainy season its waters rise above the level of these woodlands, covering the trunks of the trees, and often exposing their upper roots after subsidence. Amid the rich and varied foliage are everywhere conspicuous the thick and leathery leaves of such plants as flourish only beneath the bright skies of the tropical world, where the glorious crowns of leafage never lose that freshness and

luxuriance which is assumed by northern woodlands only in the lovely season of early spring. Hence the darker tones, blending with the gleams of flitting sunshine, develop a play of colour effects on which the eye never wearies to gaze. Countless creepers twine themselves round the stems and branches of the trees, forming here and there dense masses of foliage, impenetrable to the keenest sight and often bathed in the loveliest and most dazzling colours. In many places the observer lights upon natural bowers and arboreal groupings displaying a wealth of beauty, and even a symmetry, which could scarcely be imitated by the most consummate art.

Gulf of Paria

On entering the sea the fluvial currents are caught up by the marine current, which here sets steadily from the south-east to the north-west, in the direction of the "Serpent's Mouth," between the delta and Trinidad. But this dangerous passage is too narrow and too shallow to admit the whole stream, which here ramifies round Trinidad. The inner branch, further swollen by the western channels of the delta, penetrates into the Gulf of Paria, which thus serves as a receptacle for much of the alluvial matter carried seawards by the Orinoco. Some of the silt is no doubt again dispersed through the "Dragon's Mouth," as the northern passage is called; but enough remains to gradually raise the bed of the gulf and thus restore Trinidad to the mainland, from which it was torn by some igneous disturbance at a remote period.

Climate

As in Mexico and other parts of Spanish America, the climates in Venezuela are largely disposed in vertical

order. The hot zone, ascending from sea-level to an altitude of about 2300 feet, has a mean temperature of 77° Fahr., and may on the whole be described as not unhealthy. Above this the temperate zone, with an average temperature of about 65°, ranges to a height of 6600 feet, and is one of the most delightful regions in the world—a perfect Eden of natural loveliness, where are combined all the outward elements conducive to health and an agreeable existence. Here the coldest months are December and January, when the thermometer seldom falls below 59°, while in April and May, which are the hottest months, it scarcely ever rises above 77°.

In the cold zone are comprised all the highland districts from 6600 feet upwards. In the Sierra de Merida it penetrates at some points into the region of perpetual snow. The almost Arctic character of the elevated parimos in these highlands has already been described. Here the mean annual temperature is little more than 5° or 6° above freezing-point, and the altitude of 14,600 feet marks the upper limit of vegetation, which ranges so much higher in the western Cordilleras.

Flora

In Venezuela the vegetable kingdom is exceptionally rich and varied. It constitutes at present the chief natural resource of the country, its products forming almost the only staple of trade, while many of the species are extensively cultivated.

Foremost amongst these is the coffee plant, which has succeeded in so many parts of the New World, and constitutes the chief source of wealth in Venezuela. The best coffee grows in the temperate districts, and more especially in those tracts that are exposed to frequent early

mists. In the warmer lands it flourishes best beneath the shade of large trees, and it is noteworthy that it is always cultivated in this way in the Caffa uplands, where the plant is indigenous. In the fourth or fifth year it yields its first crop, which is gathered in October. The berries, resembling little red cherries, have their outer pulpy part first removed by a special apparatus, and are then left for a short time to decay, after which they are dried in large paved enclosures. They are afterwards passed on to the *trilla*, where, either by a stamping or rolling process, they are freed from their parchment-like inner husks. From the trilla they pass to the *venteador*, where they are subjected to a final cleansing operation. The area under coffee is now estimated at nearly 200,000 acres, and in 1906 about 43,000 tons were exported.

Other important vegetable products are cacao (*Theobroma cacao*), which thrives best in the hot low-lying districts, and needs very little attention on the part of the growers. The finest quality comes from the plantations of Chuao, which are owned by the University of Caracas, and produce a yearly crop of about 1300 lbs., while the whole State yields over 70,000 lbs. The natural home of the cacao-tree is in the great virgin forests of the Amazon, where it still grows wild in great profusion. It belongs to that class of plants in which the flowers and fruit have the singular property of sprouting directly from the woody stem and branches.

Of sugars the Tahiti cane (*Saccharum officinarum*) is the variety most widely cultivated. The ripe cane is at first crushed between iron rollers, the juice flowing through pipes into a large reservoir. From this it is drawn off into iron caldrons, and boiled up to a certain degree, the scum being removed and the fluid otherwise

clarified. It is then poured into wooden moulds, where it gradually hardens. One of the finest kinds of *cotton*, known as the South Sea Island variety, has been successfully cultivated in the district of Lake Valencia and in several other localities. But the total yield is inconsiderable, and appears to be falling off. Indigo also, formerly cultivated to some extent, has been killed by the aniline dyes, or else has given place to the more profitable coffee industry. Of *maize* the white, red, black, yellow, and violet varieties are grown. Amongst the medicinal plants the most valuable are *chinchona*, of which there appear to be many varieties, though the botanical names of several are unknown; and *sarsaparilla*, a climbing plant of a woody nature, much esteemed as a blood-purifier, and exported to the annual value of about £9000.

Amongst other less important plants are the *Amargoso*, noted for its intensely bitter bark; the curious *Maya* fruit (*Bromelia chrysantha*); the *Micadia ginoclada*, locally called *guaca*, also an excellent blood-purifier; *Guazuma almisotia*, the bark of which is used in the preparation of refreshing drinks; *Weinmannia glabra*, the bark of which has tanning properties; *Pepe de cola*, the seed of *Cola acuminata*, said to be a specific in affections of the liver; the *Pepe de cedron*, or seed of the *Sinabra cedron*, reputed to be a successful antidote against the bite of venomous snakes: the *Ojo de Zamuro*, a cure for asthma; the fruit of the *Cujajo*, from the tallow-like fatty substance of which candles are made; and several other oleaginous products.

Fauna

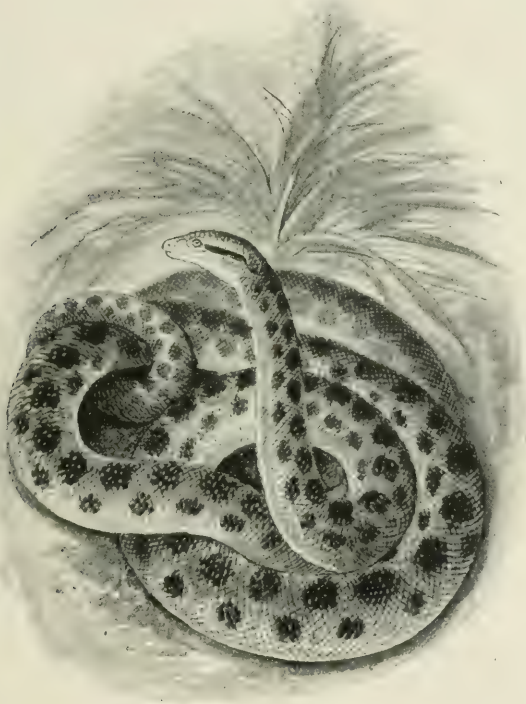
In Venezuela are represented nearly all the members of the South American mammalian fauna—the howling monkey and five other anthropoid species, several of the

cat family (jaguar, puma, ocelot), the sloth, ant-eater, and numerous species of bats, besides the lamantin and the lonina, two cetaceans which frequent the Lower Orinoco. In the same basin are also met three kinds of saurians—the true crocodile, sometimes over 20 feet long, the cayman and the bava (*Alligator punctatus*).

Of considerable economic value are the turtles of the Middle Orinoco, which lay a prodigious number of eggs, chiefly in the district between the Meta and Apure rivers. From these are annually extracted some 20,000 gallons of oil, and many of the turtles are about 3 feet long, weighing as much as 70 lbs. Another oil, the so-called "caripe butter," is obtained from the *guacharo*, a bird which frequents the Caripe caves west of the Gulf of Paria, and other parts of the coast as far as Colombia. In the *esteros*, as the rich grazing-grounds of the llanos are called, the perennial pools and rivulets attract an endless variety of animal and especially bird life. The *garzeros*, or "heronries," as the myriads of flocks are called from the dominant species, form colonies miles in extent, and comprise every imaginable variety of heron, crane, stork, ibis, some snow-white, some a delicate blue, others gray or pink, and many a brilliant scarlet. Well-beaten tracks are made under the bushes by the tramp of the small members of the cat family, who prey on the fledglings of these feathered communities. Notable is the *guiriri*, a small duck so called from its cry, which at times rises on the wing in such incredible multitudes as for a moment to produce the effect of a solar eclipse. The marshy and malarious districts are infested by the *culebra de agua*, the "water-snake," as the huge anaconda is here called. Its rival, the boa-constrictor, keeps to the woods, and both prey on wild animals, such as deer

and the capybara, and on calves or colts when they stray from the fold.

The jaguar ranges everywhere; alligators swarm in



ANACONDA.

all the streams, while the rattle-snake and even the more dreaded *lachesis*, besides other venomous species, lurk in the meadows and thickets near the wayside. Nearly all the streams teem with edible fish, and the fresh-water turtle, whose breeding-grounds along the river banks

yield prodigious quantities of eggs, which do not appear to be appreciably diminished though largely preyed upon by man and animals. But the running waters are also infested by several noxious creatures, such as the sting-ray, armed with a sharp spine several inches long; the *payara*, whose upper jaws are furnished with a pair of fangs like those of the rattle-snake; and the electric eel, with a battery strong enough to administer a powerful shock to horses entering the shallow muddy pools to quench their thirst.

Most dreaded is the really formidable *caribe*, a blood-thirsty creature resembling the gold-fish, but stouter, with a ferocious-looking bull-dog head and projecting lower jaw. With its sharp three-edged saw-like teeth it can bite in two a strong steel fish-hook, and it seems to scent blood from afar, judging from the shoals that rapidly gather round a wounded animal in the water. It will even attack wounded alligators in this way, as well as the crocodile, of which one true species is found in the Orinoco waters. But the wild hog is not an indigenous species, but the common European pig run wild. In some districts it has multiplied prodigiously, and often causes great damage by uprooting the nutritious grasses, which are usually replaced by a rank worthless vegetation.

Inhabitants—The Aborigines

Most of the tribal names recorded by the early writers have disappeared, or cannot now be identified. Many of these, however, were not ethnical but mere local designations, such as *Pariagoto, Cumanagoto*, "People of Paria," "People of Cumana," and so on. But others indicated real tribal groups that have either been absorbed in the general Hispano-American population or

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else exterminated in the wars with the first settlers. Amongst the latter were probably the *Ayamans*, a dwarfish people met by Fredemann in the uplands south of Barquisimeto, and described as scarcely 3 feet 6 inches high. The statement, which has never been verified, may be true, because pygmies of about the same size have been seen in the Congo forest zone, and the remains of similar little people have been found in the pre-historic graves of Switzerland. The great bulk of the present Venezuelan aborigines belong to the *Barré*, *Carib*, and *Arawak* stocks, and it is interesting to note that Mr. im Thurn describes the Arawaks of Guiana as the shortest of all the natives of that region.[1] Reports have also been circulated by Mr. R. C. Haliburton and others of dwarfish or undersized tribes in the Upper Amazon forests, and in Dutch Guiana, where they go by the name of Makalak, and are said to be of a "brilliant reddish-yellow" colour. But none of these reports are beyond suspicion, and there is at present no evidence to show that any of the Venezuelan tribes fall below the average height of the undersized peoples of the Andean plateaux or Fuegia.

Numerous rock-carvings, or rude pictorial writings or scratchings occur in many districts on the banks of the Orinoco (Ature rapids), and even at altitudes of 7000 or 8000 feet near the Naiguata peak in the Sierra de Mar. Such carvings as well as idols, or at least stone statues, abound especially in the Sierra de Merida, and the resemblance they bear to those of the Colombian plateau leave little doubt that they represent an easterly spread of Muysca culture in pre-Columbian times. By the present Indians, most of whom are descended from the *Timotes*, who were said to be of Muysca speech, these statues are regarded as mere *muñecos* or "dolls." But if

[1] *Among the Indians of Guian*, p. 188.

a cross is carved on the face of any of these dolls they are at once transformed to *santicos*, or "little saints," and may then be worshipped like the other saints of the Roman Calendar.

On the Orinoco delta there still survive a few thousand of the amphibious Warraus (Guaraunos), who are already mentioned by Raleigh, and described by many later observers. But they are diminishing in numbers, like the *Maypures, Otomacos, Guaicas, Guaharibos*, and most of the other Orinoco aborigines, who have been decimated by wars, epidemics, "fire-water," the forced labour system, and hardships of all kinds. All the tribal groups are destined to disappear at no distant date, if not by extinction by absorption in the *gente de razon*, the "rational people," as the settled and mixed communities are called.

Europeans and Mestizos

Few of the so-called white populations, except those of the Grita district on the northern slope of the Sierra de Merida, are of pure Spanish descent. Many of the first settlers were Basques, and for a long time a Basque Association enjoyed a monopoly of the trade with Spain. The seaports of La Guaira and Puerto Cabello were founded by them, and Bolivar, leader of the revolution, belonged to the same energetic race. The Catalonians are also largely represented, and all these Spaniards, whether of pure or mixed descent, are said to be completely acclimatised not only in the temperate zone, but even on the low-lying coastlands and on the llanos. Thousands of other Europeans and Anglo-Americans enjoy perfect health in Caracas and the other large towns of the uplands, and the rich Aragua valley between the

inland and the coast ranges is eminently suited for European settlement.

Prospects of Immigrants

But until a stable government is established, intending emigrants will be warned by the fate of the German Colony of Tovar from seeking new homes in this region. Carried away by his faith in Teutonic energy and endurance, the distinguished Italian naturalist, Agostino Codazzi, founded in 1842 a German agricultural settlement at this place, which stands on an elevated plateau some 40 miles from Caracas. For a few years the new arrivals, mostly from the Black Forest, succeeded fairly well, and their picturesque homesteads, resembling Swiss chalets, gave signs of comfort and prosperity in the Tovar district. But about 1854 progress was arrested by the civil commotions, which for a number of years paralysed all industry and enterprise in Venezuela. In 1870 the whole settlement was laid waste by the soldiers of Guzman Blanco, who converted the place into a fortified camp, demolishing whole rows of houses, and seizing every available object suitable for the purpose. Redress or compensation could not be obtained, and since then the settlers, to the number of 1250, have been dispersed over the country.

Historic Retrospect

Venezuela began its colonial existence as a dependency of New Granada—the present republic of Colombia—where the *Audiencia Réal* was established at Bogotá in 1550. In 1718 the colony became a vice-royalty, and in 1777 the four provinces of Maracaibo, Caracas, Cumana, and Guiana, that is the present republic of Venezuela, were detached from New Granada and con-

stituted a separate colony under the title of the "Captaincy-General of Venezuela."

The War of Independence, begun in 1810, was for a moment arrested by the disastrous earthquake of 1812, when the capital was levelled to the ground. Advantage was taken by the clergy, nearly all royalists, of the coincidence that this catastrophe took place on Holy Thursday, exactly a year after the declaration of independence, to declare that the hand of God had convulsed the land to crush the rebels. Their strongholds fell one after the other, and at last their leader, Miranda, surrendered the ruins of Caracas to its old masters.

But the dying embers of revolt were rekindled by the numerous bands of volunteers, who poured in from the Antilles, from the United States and Europe, and at one time numbered as many as 9000, chiefly Anglo-Americans and English. Nevertheless little progress was made until the *llaneros*, that is, the hardy "cow-boys" of the llanos, hitherto staunch royalists, suddenly took sides with the patriots, and by a harassing guerilla warfare exhausted the strength of the disciplined Spanish forces. At last the decisive battle of Carabobo (1821) put an end to Spanish misrule, and the old Captaincy of Caracas became for a time an integral part of the Republic of Colombia, which at first comprised the three present republics of Colombia, Ecuador, and Venezuela.

The success of the general movement was by common consent attributed to the "Liberator," Simon Bolivar, on grounds that have since been called in question. In any case the united confederacy, proclaimed by him in 1819, held together only till the year 1828, when it was dissolved by the Convention of Ocaña into three independent states, the Republic of Venezuela being constituted out of

the four departments of Orinoco, Apure, Venezuela, and Zulia.

During the period of absolute self-government Venezuela has been the theatre of as many general and partial revolutions as perhaps any other Hispano-American State. It would be tedious to follow the vicissitudes of these fratricidal struggles for power, some of which have been carried on with great ferocity, while others have entangled the republic in foreign complications, arising out of boundary questions or else out of claims for compensation for losses inflicted on British, German, Dutch, or French subjects by the Venezuelan Government. President Castro, elected for six years in 1905, provoked the intervention of the United States in 1906, and brought about a war with Holland in 1908, when he withdrew to Europe.

Topography—Chief Towns

As modern states are constituted, a safe indication of their economic condition may in most cases be had from the proportion of the urban to the rural population, and generally from the growth of the towns and especially of the chief centres of trade and the industries. Judged by this test, Venezuela must take rank with the most backward countries in the world. In the subjoined table of the sixteen largest places in the republic it will be seen that the population of ten only exceeds 10,000, and of one only 50,000, while the collective population of all falls below 300,000 as compared with the 2,323,000 of the whole country. In other words, Venezuela is still mainly inhabited by scattered rural communities and nomad tribes, with scarcely any large industrial or commercial centres :—

CARACAS.

Caracas	72,000	Puerto Cabello	11,000
Valencia	38,000	Ciudad Bolivar	14,000
Maracaibo	25,000	Tocuyo	10,000
Barquisimeto	31,000	Maturin	10,000
Barcelona	13,000	Maracai	7,500
La Guaira	12,000	Cumana	6,500
Ciudad de Cura	12,000	Merida	5,000
Guanare	11,000	Victoria	5,000

Caracas, the capital of the republic, was founded by Diego Losada in 1567 on the southern slope of the Silla range, at an altitude of about 3000 feet above the sea. It was captured and sacked by Drake in 1595, and since then has suffered greatly from disastrous earthquakes, and still more disastrous sieges during the Civil wars. Yet it has always risen from its ruins, and is now by far the largest city, as well as the chief centre of intellectual life in the State. Besides a national library of 32,000 volumes, and a museum, there is a university, which since the suppression of the ecclesiastical seminaries in 1872 has chairs both of divinity and the natural sciences. From its port of *La Guaira* Caracas is distant only $7\frac{1}{2}$ miles in a straight line; but so steep are the slopes on both sides that the railway, which since 1883 has superseded the old track over the crest of the Silla range, has a total length of no less than 23 miles. At La Guaira, where the normal temperature of about 82° Fahr. is rendered almost unbearable by the moist atmosphere and sultry nights, there is no natural haven of any kind. In 1821 nearly all the shipping was dashed to pieces on the encircling rocks by a violent tempest; but since then a pier and a few other harbour-works afford a little shelter to the vessels that here ship the coffees of the Aragua valley in exchange for European wares.

Valencia, at the west end of the lake to which it gives its name, is even an older place, and occupies a more

central position than Caracas. After the secession from Colombia it was for a time the seat of Government, and is still the most flourishing agricultural centre in the republic. The northern route to the spacious natural harbour of *Puerto Cabello* passes down the *Agua Caliente* ("Hot Water") valley, which takes its name from the *Trincheras* thermal streams, which are amongst the hottest

LA GUAIRA.

in the world, varying with the seasons from 196° to 206° Fahr. Southwards Valencia communicates through the towns of *Ciudad de Cura, Maracai,* and *Turmero,* with the fine pastoral districts of the upper llanos, and by railway with Puerto Cabello.

But west of Valencia the populations still continue to avoid the plains, so that all the chief towns lie either on the inland or the coast ranges, or else on the neighbouring

seaboard. Such are *Merida*, in the heart of the Sierra of like name, at an altitude of 5450 feet, which has converted its old ecclesiastical seminary into a not very flourishing university; *Trujillo* and *Barquisimeto*, still in the uplands; *Tucacas*, *Tocuyo*, *Coro*, and *Maracaibo* on the coast. The little haven of Tucacas near Tocuyo owes its prosperity to the railway, 60 miles long, which connects it with the copper-mines of the *Aroa* district. It is proposed to continue this line to *San Felipe*, *Barquisimeto*, and the other inland towns in this mineral region, and also along the coast to the historical but now decayed town of Coro at the neck of the sandy Paraguana Peninsula. Coro, founded in 1527, was the starting-point of the famous expedition under the German Captains Fredemann, Alfinger, and others, which led to the discovery of the Colombian plateau, the Rio Magdalena, the llanos, and the Orinoco. For some time it was the capital of Venezuela, but after its capture by the English in 1567 the seat of Government was removed to Caracas. Maracaibo, formerly *Nueva Zamora*, was founded in 1571 on the west side of the channel connecting the outer and inner Maracaibo basins. It thus commands the natural outlet of the vast region comprised between the Colombian plateau and the Sierra de Merida, hence must always remain the chief forwarding station for the coffee, cacao, cattle, hides, minerals, and other produce of the surrounding slopes. In the vicinity are the lacustrine dwellings of *Santa Rosa*, which exactly resemble those sighted by the first explorers, from which the whole country took the name of Venezuela.

Few other places call for mention except the little seaports of *Barcelona* and *Cumana* on the coast east of La Guaira, and *Ciudad Bolivar*, which, although situated on the Orinoco in the heart of the llanos, must also be

regarded as a seaport. At present it is the only important commercial centre in this vast basin; yet even including the thriving suburb of *Soledad* on the opposite (left) bank of the river, the population scarcely exceeds 14,000. Amongst the numerous railway projects, which must remain projects till the establishment of a stable government, is one to connect the capital across the llanos with this station of Soledad. Here the Orinoco contracts at the *Angostura* or "Narrows" to a width of less than half a mile, and in mid-stream rises the *Piedra del Medio*, or "Middle Rock," by which, when the time comes, the line will easily be carried across the river to Bolivar, and thence to the foot of the Parima uplands.

Until some such scheme of inter-communication is carried out, these desolate wilds must remain uninhabited, except by a few scattered Carib or Arawak tribes. No attempt has yet been made to develop their natural resources, so that in the whole region there appears to be not a single permanent station or centre of civilised population. Yet, judging from the gold-washings in the alluvial parts about the Cuyuni and Barima rivers, the country probably abounds in rich gold-bearing reefs, as well as in iron and other useful minerals.

Government—Social Condition

The charter of fundamental laws, which dates from 1830, and was modified in 1881, is based on the constitution of the United States, the chief difference being a larger measure of self-government conceded to the provincial and local administrations. The President, who is elected for six years, is aided by seven ministers and a Federal Council of twenty-six members, the latter being appointed by the Congress also for six years. The

BODYGUARD OF THE PRESIDENT OF VENEZUELA.

Council from their own body elect a President, who is ex-officio President of the Republic. He has no veto power over the decree of Congress, which consists of the Senate (three members for each of the thirteen States and for the Federal district) and the House of Representatives (one to every 35,000 of the population). Both Houses are elected for six years, the former by the Legislature of each State, the latter by public election. The central Government has charge of the territories and colonies and of the general defence, while the several states or provinces have each their own legislature and executive, with complete control over their own financial and judicial affairs. In fact, the only bond of union is that of the national defence, and surprise has often been expressed at the violence of the rival factions, when the coveted prize—a vetoless President, holding office for six years—seems to be of such little value. But the President is often virtually a Dictator, who administers the public funds in the interest of himself and his partisans. Perhaps under these circumstances they may claim some credit for moderation, seeing that the collective foreign and internal debt scarcely exceeded £7,200,000 in 1907. In the same year the revenue and expenditure were estimated to balance at £2,000,000. The chief source of revenue is the Customs (over £820,000), and the chief items of expenditure the administration (Civil Service), and the interest on the debt. The charge for defences is slight, the standing army comprising only about 8000 men, and the navy comprising only three gunboats, a torpedo-boat, and a transport.

The sum yearly expended on elementary education averages about £100,000 since 1870, when public instruction was made free and compulsory. In 1907 the State free schools numbered 1330 with over 120,000 pupils. For higher education provision is

made by two universities (Caracas and Merida), 22 Federal colleges, 26 private colleges, 11 national colleges for girls, and a few technical schools, with a total attendance of nearly 5000, and a public expenditure of £35,000.

Although the ecclesiastical establishments have been suppressed or secularised, the Roman Catholic remains the State religion. Toleration is extended to other denominations, which, however, are forbidden public pro-

THE CAPITOL, CARACAS.

cessions and all other outward display. In 1906 about 540 miles of railway had been completed, and in the same year the total exports exceeded £9,000,000, of which £154,000 were taken by Great Britain in exchange for £704,000 of British produce. These figures are now exceeded by those of the United States, but Great Britain still enjoys most of the profits of the carrying-trade, not only on the high seas, but also in the navigation of the Orinoco, which has mainly been developed by British enterprise.

VENEZUELA

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CHAPTER V

COLOMBIA

Boundaries — Frontier Questions — Extent, Areas, and Populations — Physical Features—The Colombian Andes—The Eastern Cordillera—The Central Cordillera—The Western Cordillera—The Sierra Nevada de Santa Marta—Hydrography—The Magdalena-Cauca Basin—The Magdalena—The Cauca—The Sinu, Atrato, San Juan, and Patia Rivers—Lacustrine Basins: Lakes Fuquene and Guatavita—Climate—Flora—Fauna—Inhabitants—The Cultured Peoples—The Chibchas—Primitive Mining Process — The Wild Tribes — The Goajiros—Topography—Chief Towns of Colombia—The Discovery—Conquest and Settlement—Colonial Administration—The Revolution—Present Regime — Religion — Education — Natural Resources — Mineral Wealth.

Boundaries—Extent, Areas, and Populations

THE "Republic of Colombia," which since 1885 is the official title of this State, occupies nearly half a million square miles of territory in the north-west corner of the southern continent, to which it is entirely confined since the loss of the isthmus of Panama in 1903. It now stretches from a little north of the equator to the Atlantic, presenting a coast-line of about 1300 miles both to the Pacific and to the Caribbean Sea. Landwards it is conterminous on the east with Venezuela, on the south-east for a short distance with Brazil and Peru, and on the south with Ecuador. Here also the frontiers may be estimated at nearly 1300 miles, although they have been definitely settled only towards Venezuela and Panama.

For the former boundary towards Costa Rica the reader is referred to the volume devoted to Central America. The boundary towards Panama, coinciding with the watershed of the Atrato and Tuira basins, runs from Mazo Point in Octavia Bay north-east and north along the crests between the rivers flowing to the Pacific and Atlantic. From the source of the Jurando it turns west towards the Aspave heights, and then north-east to the divide between San Miguel Gulf and the Atrato to the Gulf of Uraba, where it trends north-west to the source of the Tarena, and then follows the course of that river to the Gulf of Uraba. The tracts contested with the other border States involve some very extensive districts watered by the western affluents of the Amazon. But here the boundaries have not yet been settled.

Since 1905 the administrative divisions comprise 16 departments and 4 intendencias as under :—

Departments.	Area in sq. miles.	Population.
Antioquia	24,400	750,000
Atlántico	1,080	104,674
Bolivar	23,940	250,000
Boyacá	4,630	350,000
Caldas	7,920	150,000
Cauca	26,030	400,000
Cundinamarca	5,060	225,000
Galán	6,950	300,000
Huila	8,690	150,000
Magdalena	20,460	100,000
Nariño	10,040	200,000
Quesada	2,900	300,000
Santander	11,970	300,000
Tolima	10,900	200,000
Tumdama	2,390	300,000
Bogotá	—	200,000
Intendencias	277,620	
Total	444,980	4,279,674

No regular census has been taken since 1870, when the population was returned at 2,951,000, while an official estimate for 1881 gave 3,878,000. Hence, if the estimate for 1905 is approximately correct, there has been an increase of about 34 per cent during the last three decades, despite the usual political disorders, the insalubrity of the low-lying tracts and the absence of immigrants. Thus the increase is almost exclusively due to the excess of births over the mortality, an excess at present estimated at from 60,000 to 70,000 yearly. On the other hand, the uncivilised aborigines appear to be rapidly disappearing, having fallen from 220,000 in 1881 to 150,000 in 1896, if the calculations are correct. Besides these wild tribes there are about 200,000 more or less civilised and settled full-blood Indians, who are distinguished from the general population chiefly by their speech. Since the emancipation of the slaves, the Sambos, as all with a strain of black blood are here called, have decreased everywhere except on the coast-lands where they enjoy a certain immunity from malarious affections.

All the rest of the inhabitants, that is nine-tenths of the whole, are returned as "whites," although they are for the most part undoubtedly a cross between the aborigines and Spaniards from Andalusia, Catalonia, the Basque Provinces, and other parts of the Peninsula. All are of Spanish speech, and enjoy absolute social equality with the few whites who have here and there preserved their racial purity. As in Venezuela, all the settled communities are concentrated mainly on the elevated plateaux, avoiding both the hot eastern slopes facing the Amazonian plains and the low-lying malarious districts about the Lower Magdalena and Atrato rivers.

Physical Features—The Colombian Andes

Although the Andean system is continued without any break from Ecuador into Colombia, the northern section differs in one important respect from all other parts of the Cordillera. Elsewhere the ramifications enclose elevated plateaux which are usually traversed by cross ridges connecting the outer ramparts. But in Colombia the plateaux, with one or two exceptions, are replaced by deep river valleys disposed longitudinally, that is, parallel with the ramifying ranges. Thus it happens that, while many of the great rivers of Ecuador and Peru, for instance, have their sources on the eastern escarpments and drain east to the Amazon, several of those farther north flow in long depressions between the Andean ranges, and find independent outlets in the Caribbean Sea.

The Eastern Cordillera

Immediately north of the equator, where it enters Colombian territory, the Andean system spreads out like the ribs of a fan into three distinct ranges, which are sharply defined by the two fluvial valleys of the rivers Magdalena and Cauca. The EASTERN CORDILLERA, which is by far the longest, comprises four more or less distinct sections—*Miraflores, Summa Paz, Cocui,* and *Negra* (*Perijaa*),—which vary considerably in altitude, but have a general north-easterly trend. Beginning in a low ridge about 6000 feet high about the sources of the Putumayo and Yapura affluents of the Amazon, the Miraflores chain, so named from its highest peak (9200 feet), runs with a gradual rise nearly due north to the *Sierra de Summa Paz*, the "Mountains of Highest Peace," skirting the Cundinamarca plateau at a mean elevation of 11,000 feet, and

in the *Nevado* (14,146 feet) penetrating into the region of eternal snows. Viewed from Bogatá the Nevado seems, when bathed in the rays of the setting sun, like another Olympus, the serene abode of the immortals, and to this circumstance it owes its title of Summa Paz, which is often extended to the whole Eastern Cordillera.

Beyond the *Pan de Azucar* (the "Sugar-loaf," 12,140 feet) a transverse ridge is projected along the north side of the old lacustrine depression of Bogotá, where the whole space limited westwards by the Magdalena valley presents the aspect of an exceedingly rugged mountain mass carved by the running waters into a confused group of heights and crests, and merging northwards in the more regular *Sierra Nevada de Cocui.*

Here the Eastern Cordillera attains its greatest elevation in several domes from 16,000 to 16,700 feet high. Beyond the *Tama* (13,126) and *Cachiri* (13,780) peaks, near the sources of the Apure affluent of the Orinoco, the Sierra de Cocui bifurcates round the Maracaibo basin, the eastern branch bending round to join the Venezuelan Sierra de Merida, while the western, that is, the *Sierra de Perijaa* or *Sierra Negra*, runs at a lower elevation due north to the neck of the Goajira Peninsula. At first this northern section rises considerably above 10,000 feet in several crests, such as the *Horqueta* (10,768 feet) and the *Cerro Mina* and *Cerro Pintado*, both 11,000 feet. But farther on the range falls to below 6000 feet, and is crossed by passes 4000 and 3000 feet high, affording easy communication between the Lower Magdalena and the Maracaibo basin. In the Motilones district one peak rises above 8000 feet, while another, *Cerro Pintado*, a conspicuous mass of white limestone diversified with bands of light and dark green vegetation, rises near the extremity of the Sierra Negra to an estimated height of 11,800 feet.

The Central Cordillera

West of the Eastern follow the CENTRAL and the WESTERN CORDILLERAS, the former presenting an unbroken rampart of Alpine aspect between the Magdalena and Cauca valley, the latter separating the Cauca from the Pacific drainage area. The Central, or *Quindio* Cordillera, as it is often called, from the famous historical pass near the middle of the system, differs from the two lateral ramifications both in its greater altitude and its more rugged highland features, as well as in its almost exclusively volcanic character as far north as the Antioquia plateau.

Close to the Ecuador frontier rise the three cones of *Azufral* (13,360 feet), *Cumbal* (15,720), and *Chiles* (15,680), which, however, seem to belong rather to the Western than to the Central Cordillera. In fact, the main axes of all three systems cannot here be very clearly distinguished, as they all converge a little farther north in the Pasto knot, where are grouped three other volcanoes, the *Bordoncillo* (*Patascoi*), the *Campanero* (12,470 feet), and the *Pasto* (14,000), which gives its name to this remarkable Alpine entanglement, and is perhaps the most active volcano in Colombia. It often ejects red-hot stones to a great height, and from its huge crater flows a copious stream charged with sulphuric acid. In the neighbouring little Cocha tarn the Putumayo has its farthest western source.

A little farther north the Central Cordillera broadens out in the Buey plateau, where is the so-called "Massif of Colombia," true hydrographic centre of the whole region. Here four important streams, rising in close proximity, diverge to three different basins—the Patia direct to the Pacific, the Caqueta through the Amazon to

the Atlantic, the Magdalena and Cauca to the Caribbean. On the ridge separating the Patia from the Cauca stands the extinct Sotara cone (14,500 feet).

At the north-west extremity of the *Coconucos* chain, with its five snowy peaks, rises the still restless *Puracé*, which, after the explosion of 1849 was reduced to a truncated cone about 16,000 feet high. From its flanks the famous Rio Pasambio, "Vinegar River," which is highly charged with sulphuric and other acids, tumbles over a romantic waterfall 260 feet high. North of the *Guanacas* Pass (11,000 feet), which affords access from the Upper Cauca to the Upper Magdalena valley, the triple-peaked *Huila* (18,000 feet) still emits sulphurous vapours, and although the chain falls beyond *Santa Catalina* (16,170 feet) down to the Central Quindio Pass (11,440), it again rises a little farther north in the *Tolima* cone (18,400),—culminating point of Colombia, unless it is to be deprived of this honour by the snowy crest of the Sierra de Santa Marta. Tolima, which stands a little east of the main axis, has been quiescent since 1826 and 1829, when columns of vapour rose from the central crater. But it has developed several parasitic cones on its flanks, while solfataras have sprung up on the surrounding paramos and as far down as the Quindio Pass.

Farther north follow *Santa Isabel* (16,760), with thermal springs at a temperature of 148° Fahr. and the huge mass of the snowy *Ruiz* (17,390), not yet quite extinct, beyond which the igneous system proper terminates in the *Alto Pereiro*, surmounted by the imposing *Mesa Nevada de Herveo* (18,340). From the transverse ridge of San Miguel (9025) three short branches diverge northwards in the direction of the Antioquia plateau, where the main axis is dominated in the *Santa Rosa de*

los Osos ridge ("Bear Mountains") by the San Jose peak (9000), and farther north by the twin-crested *Yarumal* (7470 and 7230). The escarpments of the Antioquia plateau here fall rapidly down to the low-lying alluvial plains watered by the converging currents of the Rios Cauca and Magdalena.

The Western Cordillera

North of the Pasto knot the *Choco Range*—as the Western Cordillera is often called from the Choco aborigines formerly occupying its slopes—runs for some distance nearly due north, and so close to the left bank of the Rio Cauca that in its upper course this river seems to flow in a trench of enormous depth between rocky escarpments several thousand feet high. Here the Choco system already attains its greatest elevation in the gold-bearing *Cerro Torra* (12,600 feet), which was scaled in 1878 by Mr. R. B. White. Farther on the *Parimo de Frontino Citara* stands at a mean altitude of a little over 11,000 feet, and the same elevation is maintained by the *Paramillo*, where the various ramifying ridges of the Cordillera diverge northwards between the Cauca and the Upper Leon valleys. In the northern section the *San Jeronimo* chain, prolonged north-eastwards by the *Murucucu* group, falls below 5000 feet. But the ridge running in the same direction from the *Quinamari* plateau to the Gulf of Uraba rises to 6600 feet in the *Chigurrado* peak at the eastern entrance to that inlet. Although the Choco range nowhere develops any igneous cones north of the Pasto group, it resembles the other ramifications of the Colombian Andes in its general geological constitution—a central backbone of crystalline rocks underlying extensive cretaceous formations which

were deposited in shallow waters probably in late Secondary times.

The Sierra Nevada de Santa Marta

To a totally different system belongs the isolated mass of the snowy *Santa Marta*, which, although occupying a triangular space of little over 6000 square miles between the Magdalena delta and the Goajira Peninsula, rises, with five snowy peaks to an estimated height of over 19,000 feet. But the measurements of F. A. Simons, who in 1875 reached the Parimo de Chirugua (16,000 feet), and in a second expedition came within 500 feet of the summit, were considerably reduced by later estimates, which at present oscillate between 17,000 and 18,150 feet (Ritter). This superb mountain mass is almost completely separated from the Central Cordillera by the valleys of the two rivers Cesar and Rancheria, the former flowing north-west to the Magdalena, the latter encircling the eastern slopes in its winding course to the Caribbean Sea. The view presented by the precipitous northern slopes rising abruptly from the marine depths, and, clothed up to the snow-line by a vegetation of extraordinary splendour and variety, is one of the grandest in the New World. Granites and metamorphic rocks with some recent lavas appear to be its chief geological constituents. Earthquakes have frequently been recorded, and as igneous eruptions are said to have occurred in the eighteenth century, there is little reason to doubt the statement that the Sierra is partly of volcanic origin.

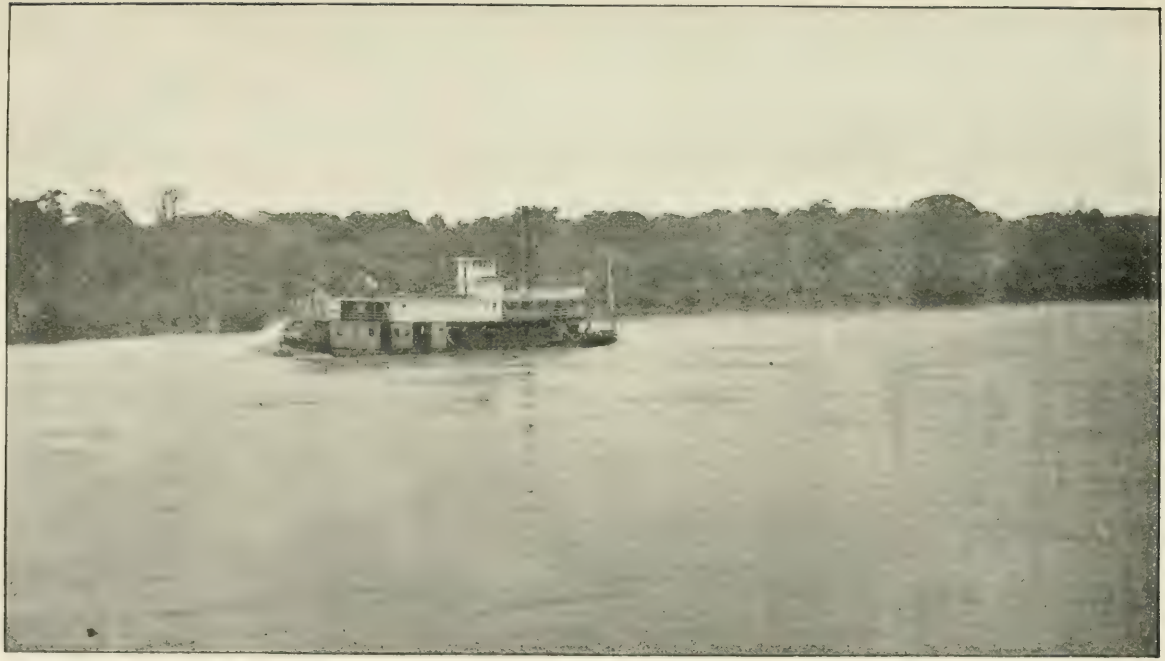
Hydrography—The Magdalena-Cauca Basin

From the general lie of the land, as above set forth, its drainage system almost explains itself. The three

Cordilleras form, broadly speaking, three divides,—the eastern, between the Atlantic and the Magdalena; the western, between the Pacific and the Cauca slopes; and the Central, between the Magdalena and the Cauca valleys. Again, the streams flowing to the Atlantic either through the Orinoco or the Amazon are, with two or three exceptions, comprised only in their upper courses within the Colombian frontiers, and belong rather to the neighbouring States of Venezuela and Ecuador, where they are described. On the other hand, the Pacific slope is too narrow to allow room for large fluvial valleys, so that only two rivers worthy of note—the Patia and the San Juan—find their way to this basin. There remain the Atrato, partly a frontier river, flowing to the Caribbean in an old marine channel, and the two great central arteries—the Magdalena and the Cauca—through which the greater part of the drainage of the three Cordilleras, that is of Colombia proper, is conveyed also to the Caribbean. Even these converge in their lower courses, entering the sea through a common delta, so that, strictly speaking, they form but one hydrographic system.

The Magdalena

But no adequate impression of the extent of this system is conveyed by the small-scale maps of Colombia, which are alone accessible to the general public. Hence most readers will perhaps learn with a feeling almost akin to incredulity that the Magdalena, that is, the larger eastern branch, is the fourth largest river in South America, being surpassed in length and volume only by the Plate, Amazon, and Orinoco, that it is over 1000 miles long, and is navigable at high water throughout its lower and upper courses for 830 miles, with a single



STERN-WHEEL STEAMER ON THE RIO MAGDALENA.

break of about 20 miles, and is joined by over 500 affluents from the Cordilleras, while the drainage area of both branches is estimated at about 100,000 square miles, that is, 8000 square miles more than the total area of England, Scotland, and Wales.

Yet for many miles in its upper reaches the Magdalena has the aspect rather of a mountain torrent, rushing, like the Cauca, down a steep incline between the high rocky walls of the Central and Eastern Cordilleras. Rising about 2° N. lat. in the Buey lakelet, which gives its name to the surrounding plateau, it takes a course north by east parallel with the two Sierras to the confluence of the *Neiva*, which marks the head of the upper navigation about 170 miles from its source. Thanks to the numerous contributions tumbling down from the encircling hills, the current here becomes broader, deeper, and more tranquil till it approaches the important station of Honda, where are developed a series of rapids about 20 miles long between Arrancaplumas and Yeguas. At this point, 603 miles above Barranquilla in the delta, the lower navigation is completely arrested, and the portage thus formed is now turned by a short railway, which belongs to an English company, and which it is proposed to continue to Conejo, 12 miles below the rapids. The lower course, which presents a clear navigable waterway of over 600 miles uninterrupted by any obstruction, is at present utilised by as many as forty steamers, all stern-wheelers, and with capacities ranging up to 300 tons.

Lower down the Magdalena is joined, chiefly on its right bank, by several large affluents, which are useless for navigation and noted especially for their wild romantic scenery. Such are the *Funza*, which a short distance below the Bogotá plateau develops the magnificent

Tequendama Falls, 475 feet high, with a volume of over 4000 cubic feet per second; the *Rio Nare*, which joins the left bank at the Nare gorge, where the main stream is 100 feet deep, with a discharge of 180,000 cubic feet per second during the floods; the *Sogamoso*, largest of all the affluents on the right bank, which is formed by the junction of the *Chicamocha* and *Saravita*, the latter falling in a narrow gorge 800 yards in the space of 3 miles, and then disappearing in an underground channel for a distance of over 200 yards.

The Cauca

After leaving its rocky bed in the Cordilleras, the Magdalena winds in a somewhat sluggish and ramifying course over the marshy and malarious plains below Antioquia to Tacaloa, where it is joined by the Cauca about 200 miles above the delta. At the confluence the Cauca has a discharge of nearly 78,000 cubic feet per second, and seems scarcely inferior in volume to the Magdalena. The length of its course to this point is also about the same; but it flows in a narrower and more precipitous channel, which is fed by fewer tributaries, and is navigable only for some miles in the higher reaches. Hence the united stream rightly retains the name of the Magdalena for the rest of its course through the lowlands to the relatively small delta which is developed a little to the west of the Sierra de Santa Marta. This delta, which is known as the island *de los Gomez*, has a seaward frontage of about 12 miles between the two chief branches, the *Boca de Rio Viejo* and the *Boca de Caniza*. This branch, which lies to the west, is the main mouth, but in order fully to develop the river traffic a safe passage for sea-going vessels requires to be

opened from Savanilla by this channel to Barranquilla, where begins the fluvial navigation proper. Pending the necessary improvements, the Boca de Caniza route, formerly utilised for the cattle trade with Cuba, has been abandoned in favour of the railway now opened from Barranquilla to Savanilla on the coast. When the shifting bar is deepened, vessels drawing 24 feet will be able to ascend the Lower Magdalena to its junction with the Cauca.

The Sinu, Atrato, San Juan, and Patia Rivers

The low-lying district between Savanilla and the Gulf of Uraba is traversed by the Sinu, a sluggish stream which rises in the Paramillo heights, reaches the coast at the Morosquillo inlet, and is accessible to small craft for over 100 miles at high water. Farther on the spacious Gulf of Darien is entered through a large delta by the Atrato, which rises near the source of the San Juan at the low sill here forming the divide between the Atlantic and Pacific basins. Owing to the heavy rainfall, fed by the vapours from the two contiguous oceans, the Atrato receives a large number of short tributaries from the surrounding uplands, and, after a course of about 400 miles, discharges into the lower part of the gulf a volume which is estimated, during the floods, at no less than 175,000 cubic feet per second. Such a volume is out of all proportion to the extent of its basin, which scarcely exceeds 24,000 square miles, and the consequence is that large quantities of alluvial matter are continually deposited throughout its lower course and along the west side of the gulf.

Thus has already been filled in the old marine channel, and the large delta with as many as fifteen shifting

mouths is now advancing steadily across the head of the gulf, so that the time must come when the *Culata*, or "Sack," as the southern inlet is called, will be transformed to a lacustrine basin. Not more than two of the mouths are navigable, and even these are obstructed by bars, which exclude vessels drawing over 5 or 6 feet. But higher up the main stream is from 40 to 60 or even 70 feet deep, and with a little dredging at the entrance would be accessible to the largest vessels for over 100 miles from the gulf. At present it is utilised only by a few boats and steamers of light craft; yet the Atrato valley must become one of the great highways of the world's traffic whenever the projected inter-oceanic ship canal is constructed. It was already pointed out by Fidalgo, over a hundred years ago, that the two navigable Rios Atrato and San Juan might be connected by a cutting a little more than a mile in length. It has also been shown that the divide might easily be pierced at the Raspadura gorge, and other more or less feasible schemes have been proposed by Trautwine, Porter, Selfridge, and other engineers.

Selfridge, who has surveyed all the rival plans, sums up in favour of the Atrato-Doguado line, which might be carried out at a cost of about £11,000,000, and is also recommended by its more healthy climate and by the possession of natural harbours at both ends. But owing to political and other causes, all these projects have been rejected for the Panama route, already partly constructed, at a prodigious cost, first under the auspices of France, and since 1903 by the United States by arrangement with the Panama Government.

The *San Juan*, which continues the main axis of the Atrato to the Pacific, is nearly 200 miles long, but with its affluents presents a total navigable waterway of about

300 miles. Unfortunately it suffers from the same drawback as the Atrato, and the bars at the mouths of its delta a little north of Buenaventura have nowhere a depth of more than 6 or 7 feet. Its discharge, estimated at 50,000 cubic feet per second, exceeds that of any other fluvial basin on the Pacific slope of the southern continent.

The *Patia*, which also reaches the coast through an obstructed delta, has its sources in the Colombian knot, being formed by the junction of the *Sotara* descending from the Sotara volcano and the *Guaitara*, which flows from the Pasto volcano. The *Carchi*, that is, the upper course of the Guaitara, forms for some distance the political frontier between Colombia and Ecuador, and here it is crossed on the route between Popayan and Quito by the Rumichaca arch, which is still popularly known as the "Incas' Bridge," although the Incas had no hand in its construction. It is a natural curiosity, like that which spans a torrent rushing down to the right bank of the James River, Virginia, but of smaller size. After escaping through the narrow Minama gorge from the Choco range, the Patia winds through the marshy coastlands to its delta, which, like those of the San Juan and Atrato, advances some distance beyond the normal shore-line.

Lacustrine Basins: Lakes Fuquene and Guatavita

Like those in so many other regions of the Cordillera, the old Colombian lacustrine lakes have nearly all been drained by the streams flowing either eastwards to the Orinoco and Amazon, or northwards to the Caribbean. *Lake Fuquene*, the largest of those still surviving from a former geological epoch, has, even within the memory of

man, been considerably reduced in size. The village of Fuquene, from which it is named, formerly stood on its banks, but is now 3 miles distant, and travellers in the seventeenth century describe it as a large sheet of water nearly 30 miles long and 8 wide, whereas at present it is only 4 or 5 miles by 3. The lake, which has a mean depth of about 24 feet, is traversed by the Saravita branch of the Sogamoso affluent of the Magdalena.

The Cundinamarca plateau was undoubtedly at one time a vast lacustrine basin, which has discharged most of its contents through the Bogotá (Funza) to the Upper Magdalena. Nothing now remains except a few little flooded depressions, one of which, however, *Lake Guatavita*, is of some historic interest. In pre-Columbian times this lakelet was the scene of certain periodical ceremonies, which unquestionably gave rise to the myth of El Dorado. One of the solemn functions fell to the part of a great chief of the Chibchas, who, powdered all over with gold-dust, plunged into the pool, and the ablution by which he was divested of his glittering garb was taken as a proof that the offering thus made of all his wealth was accepted by the tutelar deity of the Chibcha nation. This was the true "Man of Gold," whom, even after his discovery, the treasure-seekers continued to go in quest of over half the continent.

Climate

Owing to its highly-diversified relief, the disposition of the three Cordilleras, narrow pent-up fluvial valleys, sloping inland plains, flat marshy coastlands, irregular distribution of heat and moisture, Colombia presents a greater variety of climates than almost any other region of equal extent. So completely is latitude neutralised

by elevation on the uplands, that, despite their proximity to the equator, some of the more favoured plateaux enjoy a delightful climate, corresponding, as regards temperature, somewhat to the spring and autumn of the temperate zones. Here the extremes of winter and summer are unknown, and the alternating seasons, which follow the regular course of the sun, are determined rather by the varying degrees of moisture and dryness than by those of heat and cold. Thus there are two wet seasons (*veranos*), when the sun is at the zenith, and two dry seasons (*inviernos*), when he approaches the tropics.

On the Bogotá tableland the glass oscillates between about 50° and 78° Fahr., while the annual rainfall rarely exceeds 45 inches. The heavy downpours are often accompanied by terrific thunder and hail-storms, but after their passage leave the atmosphere pure and bright. Owing, however, to local causes, clear skies are a rare phenomenon on the Pacific slopes of the Western Cordillera, where the verano may be said to prevail throughout the year. Being completely sheltered from the cool north-east trade-winds, the Pacific seaboard retains the heavy, moisture-laden clouds rolling up from the ocean, and is thus exposed to drenching rains at all seasons.

Another contrast is presented by the sultry inland plains sloping from the Eastern Cordillera towards the Orinoco and Amazon, where the mean temperature seldom falls below 86° Fahr., and in some places, the so-called "Colombian hells," rises to 90° or 91°. Even more stifling heats prevail in some of the central fluvial valleys, where the cool trade-winds are intercepted by the ramifying Cordilleras. Here the glass indicates a mean of about 88°, often rising as high as 104° in the shade. In fact the Magdalena and Cauca valleys are nearly ten degrees hotter than the Atlantic coastlands,

which, despite their greater distance from the equator, are themselves hotter than the Pacific slope. The difference has been attributed to the influence of Humboldt's cold Pacific current.

Special conditions prevail on the low-lying Atlantic seaboard, which is exposed to the full fury of the trade-winds, and although true hurricanes never range quite so far south, the Caribbean waters are often churned up by the fierce north-easterly gales. The rainfall is excessive on all these coastlands, ranging from 100 inches about the Santa Marta slopes to perhaps 200 in the Atrato valley and on the Pacific slope. This heavy discharge, combined with the sweltering heats and the supersaturated soil of the flat lowlands, sufficiently accounts for the malarious nature of the plains traversed by the ramifying branches of the Rio Magdalena. Here cutaneous diseases, leprosy, and elephantiasis, are very prevalent, and nearly all the inhabitants of certain villages present a repulsive sight, with face and body spotted all over, like the jaguars of the neighbouring thickets. In the upper valley goître and cretinism are common, so that in no part of the world are greater contrasts presented than by the salubrious and almost vernal climate of the plateaux and the fever-stricken riverine valleys and lowlands of Colombia.

Flora

Like all moist tropical lands, Colombia possesses an extremely rich and varied flora, which, however, is of a somewhat cosmopolitan character. The relatively few indigenous species are associated with numerous forms, which have gravitated towards this transitional region from the Southern Andes, from Venezuela, and from Central America. Although nowhere forming continuous

forests, but growing in isolated clumps or intermingled with other plants, the palms are amongst the most characteristic and useful members of the vegetable kingdom. Such are the *tagua*, whose melon-shaped pods contain the hard grains known as "vegetable ivory"; the *Carludovica palmata*, the ribs of whose fan-shaped leaves supply the material of the costly "panama hats"; the *corneto* and *wax-palm*, the former with plum-like fruits growing in enormous clusters, weighing up to 200 lbs., the latter with a straight and slender stem, which yields as much as 24 lbs. of a waxy substance. In the Central Cordillera these palms range up to over 10,000 feet, and the same altitude is reached by the tree-ferns, also a numerous family applied to a variety of purposes. With the stems of some placed side by side, like railway sleepers, are constructed those *empalisados*, "palisade roads," without which certain marshy districts would be impassable.

Amongst the numerous medicinal plants is the *cedron*, said to be even a better specific against agues than the chinchona, of which there are several varieties. Other more or less characteristic forms are the *racacha*, known as the celery of the Andes; the *befaria*, or American alpine rose, resembling the rhododendron, and ranging up to 11,000 feet; dye-woods like those of Brazil and Campeachy; the magnificent red cedar, and orchids in great variety. The finest of these have already been nearly extirpated by the collectors, and are also indirectly the cause of great havoc amongst the splendid forest growths that give them shelter. Mr. Albert Millican tells us that in two months he caused the destruction of 4000 large trees in order to secure about 10,000 specimens of the superb *Odonto glossum*.[1]

[1] *Travels and Adventures of an Orchid-Hunter.*

Fauna

There is reason to believe that some of the huge extinct animals — megatheriums, glyptodons, taxodons, horses of earlier types, mastodons — which formerly abounded in Colombia, survived till comparatively recent times, and in any case were almost certainly associated with primitive man. Mr. R. B. White records the discovery of the complete skeleton of a mastodon in the

TOUCAN.

paved stone channel of a salt-spring near Concordia, where it had evidently been overwhelmed by an enormous landslip. He also refers to the necklaces from Indian graves made of the molar-fangs of mastodons, so well preserved that they could scarcely have been the fossil teeth of long-extinct animals dug up by the natives.[1]

Of the living fauna both the mammals and most of the birds belong, like the plants, to the same genera or species as those inhabiting the surrounding lands. Such

[1] "Notes on the Aboriginal Races of the North-West Provinces of South America," in *Jour. Anthrop. Soc.* (1884), p. 244.

are the puma, jaguar, sloth, ant-eater, tapir, peccary, apes, king vulture, eagles, toucans, and humming-birds. Of the last-mentioned lovely little creatures Mr. Simons discovered as many as five distinct species on the Santa Marta heights, and these uplands are also noted for the prodigious multitudes of gorgeous butterflies which hover, like iridescent clouds, above their seaward slopes. A remarkable feature of animal life in these regions is the curious habit of some species to confine themselves to certain limited areas, beyond which they never range. Thus no venomous snake is met on the slopes of the Cordilleras above the altitude of 6000 feet, while in some districts the swarms of mosquitoes are abruptly arrested at a given line without any apparent reason.

Inhabitants

From the extensive surveys carried on for many years, especially in the old gold-mining provinces, it is evident that before the Conquest a certain measure of culture was far more widely diffused amongst the Colombian populations than has hitherto been supposed. But the *Chibchas* alone had developed powerful political states, and to this circumstance may be attributed the oblivion into which other smaller but no less civilised groups have fallen. Such were the *Coconucos*[1] and others of the Popayan district towards the Ecuador frontier, who had made some progress in the arts under Peruvian influences, as shown by the numerous Quichua terms in their language. Such were also the civilised *Guanos* of the Sogamoso valley, and especially the *Nutabi* and *Tahami* nations of the present department of Antioquia, who had in some respects surpassed the Chibchas themselves.

[1] Illustrated on p. 173.

The Cultured Peoples—The Chibchas

Of the Chibchas the proper national name appears to have been *Muysca*, literally "body-five," that is "man," in reference to the ten fingers and toes of the extremities used in counting up to twenty. Hence in their vigesimal system Muysca came also to mean *twenty*, that is, all the fingers and toes of the human body. This circumstance alone shows that they had made some intellectual progress beyond most of their neighbours, whose arithmetic was limited to *five*, or even *two*. Although not so far advanced as the Quichuas, they deservedly rank amongst the cultured peoples of the New World. They constructed paved highways, threw light but durable suspension-bridges across the river gorges, erected stone shrines to the gods, carved their effigies also in stone, were skilled weavers, potters, and dyers, made use of weights and measures, and were even credited with a currency in the form of gold discs. In any case they excelled in the working of the precious metal, which was both cast and wrought into all kinds of fantastic ornaments, displaying much imagination in the designs and technical skill in the execution. The Chibcha territory comprised not only the Cundinamarca plateau between the Magdalena and the Suma Paz range, but also the uplands of the Eastern Cordillera as far as the Sierra de Merida. But this extensive domain was divided between two rival chiefs, the *Zipa* and the *Zaque*, *i.e.* rulers of the "south" and "north," who were seldom at peace, and were both at last overwhelmed by the Conquistadores while engaged in an exceptionally fierce struggle for the supremacy over Muyscaland. The Chibcha language is said to be extinct, and the Chibcha people, who numbered over a million before their reduction, have long been

MUYSCAS.

merged in the common Hispano-American nationality of Colombia.

Throughout the whole of the cultural zone are scattered great numbers of *huacas* (*guacas*) or sepulchral mounds, some of which are over 40 feet high, and often contain great stores of gold and precious stones. These abound especially in the auriferous Antioquia districts, where the *huaqueros*, as the plunderers of the huacas are called, have occasionally extracted treasure to the value of several thousand pounds sterling from a single grave. One opened about 1830 yielded £3600 worth of gems, and Mr. White had personal knowledge of three burrows "containing gold ornaments to the amount of £4000, £8000, and £13,000 respectively."[1]

Primitive Mining Process

In this part of the country the auriferous quartz-reefs had already been tapped by the natives in pre-Columbian times. But the process everywhere adopted by them was peculiar, and might be described as a method devised to yield the least returns for the greatest expenditure of labour. Shafts were sunk, some to a depth of 160 or 180 feet, down to the lodes, but no side galleries were ever opened, so that when the lode where struck was exhausted, or proved barren, another shaft was sunk a few yards off, and so on. In the northern districts of Antioquia the workings were very extensive, and thousands of hands must have been employed upon them. They were continued for some time after the arrival of the whites in a more intelligent way, and Mr. E. J. Chibas tells us that these early Spanish mines have lately been re-discovered, and are now being worked afresh with

[1] *loc. cit.* p. 247.

good prospects.[1] All the implements used by the natives for mining and all other purposes were of stone, except in the Popayan district, where considerable quantities of obsidian knives and other tools have been found. These were supposed to have been imported from Guatemala, and thus to prove regular intercourse with Central America, until the obsidian was traced to the neighbouring Puracé volcano by Dr. Stübel and Mr. White.

The Wild Tribes—The Goajiros

Elsewhere in Colombia the passage from the cultural to the cultureless zone was as abrupt as in other parts of South America. The *Paezes*, the *Chocos* with the kindred *Baudos*, *Tados*, and *Noanamas*, the *Catios*, *Cunas*, and others of the uplands, the Pacific and Caribbean coastlands, as well as the *Mitues*, *Betoyes*, *Uitotos*, *Carizones*, *Miranhas*, *Orejones*, *Piajes*, and *Encabellados* of the inland plains, were and mostly still are in a state of nature. Many were undoubtedly cannibals who, like the African Mangbattus, "fattened their captives for the table," and the habits of some were so repulsive that the Spaniards considered themselves justified in ruthlessly exterminating them. Even the impartial Cieza de Leon, who often denounces his fellow-countrymen for their atrocious treatment of the natives, speaks with approval of the barbarous way the savages of the Aburro valley were disposed of. "The detestation we conceived for these Indians was such that we hung them and their women by their hair to the boughs of trees, and left their bodies there, while amidst grievous moans their souls went down to hell." Wholesale butcheries undoubtedly took place, while hundreds of thousands were enslaved and "used

[1] *The Engineering Magazine*, Oct. 1898.

up" in the service of their new masters, with the result that the whole population, estimated by some at about 8,000,000 (probably 3,000,000 in the thickly peopled departments of Cauca and Antioquia alone), fell soon after the Conquest to less than one million. Many were too paralysed to offer any resistance, and many more threw themselves over the cliffs, thus perishing voluntarily rather than fall into the hands of the invaders. But some retaliated, and in the Antioquia district poisoned the salt-springs so effectually that they remain poisoned to this day. The springs were covered with the branches of the *doncel*, a kind of "upas tree" different from the better known *manzanillo*, and the water percolating through became so excessively poisonous "that after a lapse of 300 years this vegetable matter still retains its venomous properties . . . and I have seen three horses killed in one night from drinking at one of these poisoned springs" (White, p. 251). It may be added that when

GOAJIROS.

preparing a deadly virus from the blood of a species of frog, some of the wild tribes were in the habit of trying its efficacy on their old women.

From the charge of cannibalism and of other degrading practices should be exempted the *Goajiros*, who gave their name to the peninsula, where they have hitherto maintained their political independence, and still preserve the same tribal and social institutions as at the time of the discovery. They engage chiefly in turtle-fishing and horse-breeding, and avoid all contact with the outer world, except at the frontier station of Rio Hacha, where they come to exchange the products of the country for manufactured goods. The neighbouring *Aruacos* of the Santa Marta heights appear to be also somewhat in advance of the wild tribes, for they till the land and raise crops of sugar, bananas, potatoes, and coca.

The present Colombian nationality results from a fusion in varying proportions of aborigines, especially the Chibchas, Popayans, and Antioquians, with the whites from various parts of Spain, including a considerable number of baptized Jews. This Semitic element appears to be still conspicuous, especially in the department of Antioquia, which has always been noted for the thrift and industry of its inhabitants. Unity is imparted to all the settled populations by the exclusive use of the Spanish language, and by a common administration which in recent years has shown a remarkable tendency towards centralisation.

Topography

This centralising tendency is seen even in the distribution of the population, which is concentrated in large urban centres to a much greater extent, both relatively and absolutely, than in the neighbouring States

of Venezuela and Ecuador. From the subjoined table it will be seen that, besides the capital, there are several places with over 20,000 inhabitants, while those exceeding 5000 may be numbered by the score:—

Chief Towns of Colombia

Santa Fé de Bogotá	100,000	Pesca	13,000
Medellin	60,000	Paipa	13,000
Barranquilla	40,000	Buga	13,000
Socorro	25,000	Ipiales	13,000
Cartagena	14,000	Ibagué	12,000
Bucaramanga	20,000	Moniquira	13,000
Chiquinquira	21,000	Miraflores	12,000
Soata	18,000	Zipaquira	12,000
Puente Nacional	16,000	Guamo	12,000
Cali	16,000	Popayan	10,000
Palmira	15,000	Antioquia	10,000
Neiva	15,000	Sabanalarga	10,000
Velez	15,000	Jenezano	10,000
Sogamoso	15,000	Pamplona	10,000
Manizales	20,000	Espinal	10,000
La Mesa	14,000	Fredonia	10,000
Sonson	14,000	Yarumal	10,000
Sanjil	15,000	Tunja	10,000
Cucuta	13,000	Carmen	8,000
Jiron	13,000	Santa Marta	6,000
Pasto	6,000	Savanilla	6,000
Duitama	13,000	Buenaventura	6,000
Aguadas	13,000	Honda	6,000
Rionegro	13,000		

Santa Fé de Bogotá, or simply *Bogotá*, capital of the State, stands on a ramifying tributary of the Rio Funza, about 12 miles south-east of *Bacatá*, the old capital of the southern Chibchas, from which it takes its name. Before its destruction by the Spaniards Bacatá was said to contain 20,000 houses, and if so it must have been as large a city as its successor now is. The new capital, founded by Quesada soon after the Conquest on a

BOGOTÁ.

pleasanter and more salubrious site near the foot of the Suma Paz Range, 8680 feet above sea-level, has been a chief centre of Spanish culture throughout colonial and later times. Besides a national university, it possesses a valuable library of over 50,000 volumes, an observatory, a picture gallery, and several learned institutions. But its prosperity has been greatly hampered by the lack of

MAIN STREET OF BOGOTÁ: LADIES WEARING MANTILLAS.

easy communications with the surrounding lands. To remedy this defect three railway schemes have been taken in hand, one running north to the Sogamoso confluence, another north-west to the Rio Negro confluence, and a third south-west to the Popayan district for Ecuador. The first section of this important line is already completed as far as *Girardot* on the Upper Magdalena. Some distance above this place lies the riverine

station of *Neiva*, founded in 1540 at the confluence of the tributary from which it takes its name, but after its destruction by the Indians removed 15 miles lower down to a point which marks the head of the upper navigation for small steamers.

Honda, at the rapids, where the upper navigation

MAIN ROAD, HONDA TO BOGOTÁ.

begins and the lower stops, was in colonial days the central depôt for distributing the European merchandise forwarded from Carthagena by the Magdalena for the Bogotá and Popayan districts. Since the construction of the railway which turns the rapids and has its termini at *Las Yeguas* and *Arrancapluma* above and below Honda,

this place has lost its importance. Near the source of the Sogamoso, which traversed the territory of the northern Chibchas, stood their capital, *Hunsa*, now replaced by *Tunja*, capital of the department of Boyaca. *Sogamoso*, which gives its name to the river, is also a historical place, which perpetuates the memory of the *Sogamuxi*, or High Priest of the Chibcha people. He resided at *Iraca*, close by, where was the richest temple in all the land, a huge wooden structure covered all over with plates of gold, but accidentally destroyed by fire during its sack by the Spaniards. The few days that the conflagration lasted were extended in the popular imagination to several years.

Iraca, holy city of the Chibchas, has in a sense been replaced by *Chiquinquira*, holy city of the present Colombians, which lies in the same fluvial basin a little north of Lake Fuquene. Here is one of the most famous "Miraculous Virgins" in South America, which is a perennial source of wealth to the place, being visited in some years by as many as 60,000 devout and generous pilgrims. In the same romantic district, south-east of Tunja, stands the historical town of *Boyacá*, also a place venerated by all Colombian patriots, for here Bolivar gained the decisive victory which secured the independence of the country in 1819. Other historical events are commemorated by the city of *Socorro*, on the Rio Suarez, former capital of the neighbouring department of Santander, and scene of the first revolutionary movements in 1781. *Ocaña* also, in the same district, will always be remembered as the place where was signed the Treaty of 1828, which dissolved the transient union of the three allies—Colombia, Venezuela, and Ecuador. But Ocaña has other claims to consideration, for it occupies a most convenient and healthy position 3820

feet above sea-level about the sources of the Catatumbo, which affords direct access to the Maracaibo basin, and a natural seaward outlet for the produce of the north-eastern departments independent of the insalubrious lowlands about the Lower Magdalena and its delta.

Barranquilla, on the chief navigable branch of the delta, is at present the most important centre of the

GATEWAY OF CARTAGENA.

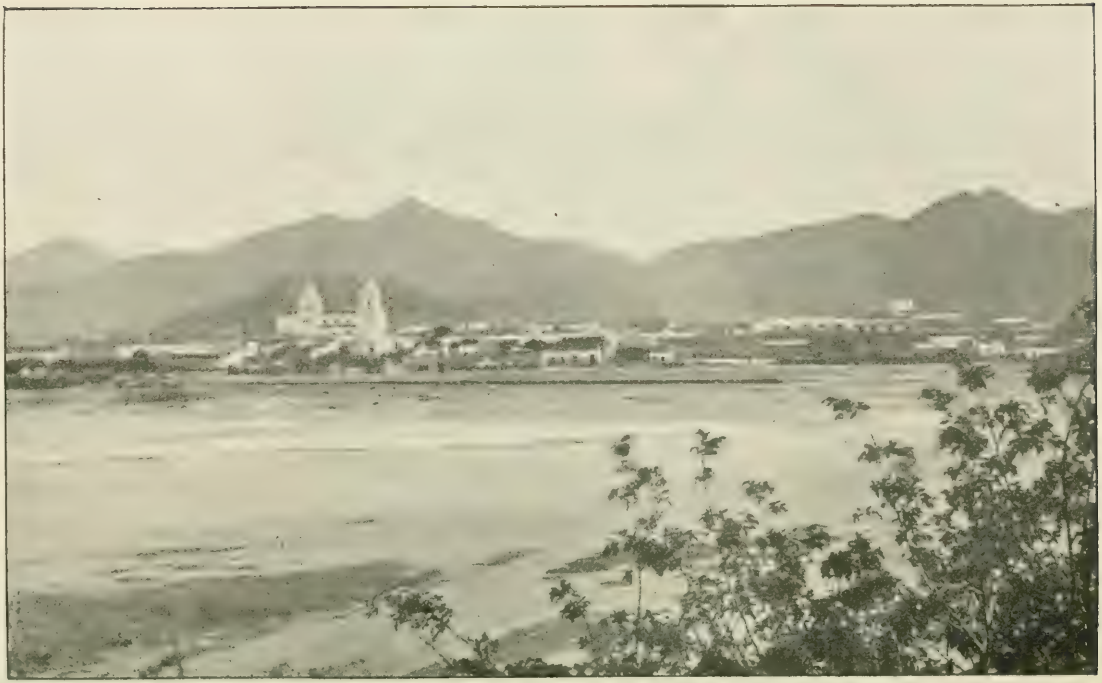
foreign trade of the country. It is connected, by a railway 20 miles long, with the exposed seaport of *Savanilla*, and need fear no rival except *Cartagena*, which lies a little farther west on the only good natural harbour in Colombia. In colonial times "Cartagena de las Indias" enjoyed a complete monopoly of all commercial intercourse with Spain, but was a sealed port for the rest of the world, and as if to emphasise this fact, the Central Government converted it into a fortress of immense

strength at an outlay of no less than £12,000,000. Nevertheless it was nearly ruined during the siege of 1815, and, having lost its exclusive privileges with the fall of the colonial system, has never recovered its former prosperity. The harbour, formed by a group of islets, on one of which stands the town, is well sheltered, and has a depth of 60 feet, but is of difficult access. *Santa Marta*, the only other seaport on the Caribbean Sea, was founded by Quesada at the foot of the Sierra to which it gives its name in the year 1525, and is consequently the oldest Spanish settlement in Colombia.

On the almost uninhabited Pacific seaboard the only outlet for trade is *Buenaventura*, founded in 1821 on an islet in a deep and well-sheltered inlet a little to the south of the San Juan estuary.

In the Cauca basin *Popayan*, near the source of the main stream, about 6000 feet above sea-level, dates from the year 1536, when it was founded by some of Belalcazar's people. Although a small place, it claims to be a chief centre of modern culture, a sort of "Colombian Athens," which, however, suffers from the want of good communications, though standing on the old historical route to Ecuador.

Lower down the Cauca valley several considerable centres of population have sprung up in the mining and agricultural districts along the main stream and some of the lateral river valleys. Such are *Cali*, one of the pleasantest towns in Colombia, founded in 1536 within 60 miles of the Pacific at Buenaventura, with which seaport it is connected by rail; *Manizales*, founded in 1848 at the junction of two main routes over the Central Cordillera, a thriving centre of the gold and stock-breeding industries, and already the chief trading-place in South Antioquia; and *Medellin*, present capital



SANTA MARTA.

of the department of Antioquia, and second city in the republic, situated in the rich Aborra valley 4860 feet above the sea. Medellin has completely eclipsed the much older city of *Antioquia*, which gives its name to the whole region, and dates from the year 1541. *Candelaria*, as Medellin was at first called, was founded in 1674, but remained little more than a rural hamlet till after the Revolution, when it increased rapidly with the development of mining operations. It is now the chief centre of the gold interest, with a local mint, a departmental university, and several technical schools.

On the almost uninhabitable lowlands below Antioquia there are no towns or groups of population except a few little riverine stations, such as *Maganqué* and *Tacaloa*, which marks the point where the Cauca and Magdalena converge in a common channel.

The Discovery—Conquest and Settlement

After the first survey of the seaboard, as far as the Gulf of Darien, by Bastida and his pilot, Juan de la Cosa, in 1496, it was again visited by Columbus in 1498. The Pacific coast was traced by Andagoya in 1522, but no attempt to penetrate inland was made till 1530, when the ferocious Alfinger overran and wasted the present departments of Magdalena and Santander. He was soon followed by Heredia, Cesar, Vadillo, and Robledo, who discovered the plateaux of Antioquia and the rich Cauca valley. Then by an extraordinary coincidence, unique in the history of exploration and adventure, the Chibcha plateau was simultaneously reached in 1538 by three separate expeditions starting independently from three opposite points—Quesada's from Santa Marta on the coast at the foot of the Sierra, Belalcazar's from

Quito by the Popayan route, and Fredemann's from Coro, at the neck of the Paraguana Peninsula in the present Venezuela. Arriving thus unexpectedly in the very citadel of El Dorado, the leaders were at first disposed to fall foul of each other, but more prudent counsels prevailing, they decided at last to divide the spoils between them. Some idea may be formed of the general character of these pioneers from the language of an early writer, who describes one of them as a combination of quicksilver and lightning. Like the former, he drew to himself all the precious metals found in the houses; like the latter, he destroyed the houses themselves. And thus began the "settlement" of New Granada, as the whole region was first called by Quesada, after his native place in Andalusia.

Colonial Administration

This settlement brought nothing but the direst calamities on the unhappy aborigines, who were handed over to *encomenderos*, who were commissioned to exploit land and people on behalf of the Crown and in their own interest. These ministers of an ignoble policy swept the helpless natives into the mines or on to the plantations. They perished in multitudes, while the more refractory groups were extirpated root and branch, so that nine-tenths of the inhabitants disappeared in a few generations.

Then came the turn of the settlers, who, whether full-blood or half-castes, had now to submit to the narrow system of monopolies and favouritism inspired by the jealous policy of the mother country. The right of trading at all became the exclusive privilege of Spaniards, who were alone permitted to export the produce of the

land from Carthagena, and import such wares as Spain could supply in exchange. This degrading system, despite of occasional administrative changes, was practically maintained down to the period of the Revolution. The Presidency constituted in 1565 became a Viceroyalty in 1719, on which in 1740 was conferred the title of *Nuevo Reino de Granada* (New Kingdom of Granada).

The Revolution—Present Régime

Symptoms of unrest had already made themselves felt in 1781, when local revolts were with difficulty repressed by slight alleviations of intolerable burdens. But the flames of discontent extinguished in one place broke out in another, until the whole land was enveloped in the great conflagration which began in 1810, and was not fully spent till 1819 under circumstances already described in the previous chapter. The Republic of New Granada, as constituted by the solution of the Triple Alliance after the Treaty of Ocaña (1828), adopted in 1861 a federal constitution under the title of *United States of New Granada,* with nine confederate States. Then, after further vicissitudes, centralising tendencies manifested themselves, and by the new Constitution, promulgated in 1886, the autonomy of the nine States was abolished, and they became simple departments of the *Republic of Colombia,* as it is now officially called. The former presidents are merely governors of the departments directly nominated by the President of the Republic, who is himself chosen by electoral colleges for six years. There are six ministers or "secretaries" responsible to Congress, which comprises a Senate of forty-eight members (all elected for four years), and a House of Representatives, with at present sixty-seven members, that is, one for

every 50,000 inhabitants, also returned for four years by universal suffrage. For the further administrative changes made in the year 1905 see above, p. 114.

Religion—Education

As in Venezuela, the religion of the State is Roman Catholicism, tolerance being extended to all others, so far as they conform to the law and to the general precepts of Christian morality. Primary education is free but not compulsory, and provision is made for higher instruction by a national university, four departmental colleges, thirty-four public colleges, and fifteen normal schools. But in 1895 the total attendance, including primary schools, scarcely exceeded 95,000, instead of about 300,000, which would be a fair proportion for the whole population.

Natural Resources—Mineral Wealth

So varied and abundant are its natural resources, both above and below ground, that, under a firm and enlightened administration Colombia, despite the insalubrious climate of many districts, might soon become one of the most prosperous regions in the world. It supplies nearly all the platinum as well as the very finest emeralds brought to the European market, while gold-bearing reefs and washings occur almost everywhere, the total annual yield being about £650,000, and the yield of gold and silver since the discovery nearly £150,000,000. In 1891 as many as 4960 mines of all kinds were open, including 3398, 794, and 571 of gold in the three departments of Antioquia, Tolima, and Cauca respectively,

COLOMBIA

To face page 152

80°
75°
70°
10°
5°
0°
CARIBBEAN SEA
PACIFIC OCEAN
COLOMBIA
ECUADOR
PANAMA
BAY OF PANAMA
LAGOON OF MARACAIBO
MARACAIBO
Maracaibo
Bahia Honda
Gallinas
Paraguana
Puerto Colombia, Sabanilla
Magdalena
Barranquilla
Cartagena
Morosquillo
Tolu
Zaragoza
Tenerife
Plato
Calamar
Mompox
Honda
Bogota
Tunja
Pamplona
Cucuta
Ocaña
Salazar
Giron
Socorro
Velez
Medellin
Antioquia
Remedios
Zaragoza
Caceres
Mompox
Tamalameque
Chiriqui
Veraguas
Azuero
Panama
Pearl Is.
Parita B.
Caledonia B.
Limones Cays
Ratones Cays
Aspinwall
Porto Bello
Chagres
Mandinga
Puerto Belo
Pt. Manzanillo
Pt. Blas
Mulatas Arch.
Tabogo I.
Chamé
Taboga I.
Perico I.
Flamenco I.
Naos I.
Culebra I.
Otoque
Taboga
Pacific Mail S.S. Co's Dock
Panama R.
Panama
Old Panama
Ruins of Old Panama
Cathedral
Cruces
Gorgona
Chorrera
Pt. Mala
Parita
Pt. Garachine
Pt. Parita
Pt. Cocalito
Pt. Quemado
C. Marzo
Octavia
Cupica
S. Francisco Solano B.
Solano Pt.
Pt. Piza
Coqui R.
C. Corrientes
Cabita Pt.
Baudo R.
Docampado R.
Chirambira Pt.
R. S. Juan
Magdalena B.
Choco B.
Cayambre R.
Reyes Pt.
Guascama Pt.
S. Juan
Sala Honda
Patia R.
Tumaco
Mangles Pt.
Ancon de Sardinas
Verde Pt.
Esmeraldas
R. Esmeralda
Galera Pt.
C. S. Francisco
Manglares Pt.
Cognate Reefs
Pedernales Pt.
Equador
Pasado
Tumaco Pt.
Colorado Pt.
Tumaco
Mosquera
Barbacoas
Ibarra
Quito
Pichincha
Cotopaxi
Tungurahua
Sangay
Cayambe
Antisana
Cotacachi
Imbabura
Chimborazo
Altar
Sangay
Cuenca
Loja
Zaruma
Tumbez
Guayaquil
Puna I.
Santa Elena Pt.
Manglares Pt.
Bahia de Caraquez
Cape Pasado
Jipijapa
Portoviejo
Montecristi
Manta
Cape San Lorenzo
Pt. Aguja
Pt. Malpelo
Gorgona I.
Gallo I.
Malpelo I.
Cocos I.
Aethonia Ind.
Xebero Ind.
Tariana Ind.
Maina Hanas
Tamanaco
Providencia
Conception Hills
Yapurá R.
Japurá R.
Caquetá R.
Putumayo R.
Iça R.
Negro R.
Solimões R.
Amazon R.
Tapajos R.
Madeira R.
Purus R.
Ucayali R.
Huallaga R.
Marañon R.
Pastaza R.
Napo R.
Tigre R.
Pacaya L.
Morona R.
Santiago R.
Zamora R.
Chinchipe R.
Huancabamba R.
Chira R.
Piura R.
Tumbez R.
Jequetepeque R.
Chicama R.
Moche R.
Viru R.
Santa R.
Lacramarca R.
Nepeña R.
Casma R.
Huarmey R.
Fortaleza R.
Pativilca R.
Supe R.
Huaura R.
Chancay R.
Rimac R.
Lurin R.
Mala R.
Cañete R.
Chincha R.
Pisco R.
Ica R.
Nasca R.
Acari R.
Ocoña R.
Camana R.
Quilca R.
Tambo R.
Moquegua R.
Locumba R.
Sama R.
Caplina R.
Tacna
Arica
Pt. Gallinas
Pt. Espada
Pt. Carrizal
Pt. Macolla
Pt. Cardon
G. of Coro
Coro
Pt. Zamuro
Pt. Leaves
Tocuyo
Barquisimeto
Carora
Tocuyo R.
Yaracuy R.
Portuguesa R.
Apure R.
Arauca R.
Meta R.
Guaviare R.
Inirida R.
Vaupes R.
Caqueta

besides 32 of emeralds, 14 of cinnabar, 7 of manganese, and several of platinum, silver, copper, lead, mercury, iron, coal, and salt. Extensive coalfields and reservoirs of petroleum occur in several districts, so that few regions can compare with Colombia for the astonishing variety of its underground products. Scarcely less varied are those of its forests and cultivated lands, including coffee, cocoa, tobacco, sugar, vegetable-ivory, rubber, dye-woods, plantains, wheat, and maize. But at present only a small part of the country is under tillage, and the development of its agricultural resources is greatly retarded by the lack of good communications. In 1897 only 400 miles of railways had been opened, and only 270 miles were in progress, while the so-called roads are for the most part mere mule-tracks.

CHAPTER VI

ECUADOR

Extent, Boundaries, Areas, and Populations—Relief of the Land—The Eastern Cordillera and the Pacific Coast Range—The Avenue of Volcanoes—Chimborazo—Tunguragua—Altar—Cotopaxi—Hydrography—The Rios Guayas and Esmeraldas—The Rio Pastasa—The Rio Napo—Climate—Flora—Fauna—Inhabitants—The Quitus and Caras—The Jivaros—The Zaparos—The Piojes—History—Colonial Rule—The Republic—Topography—Resources—Land Tenure—Administration—The Galapagos Islands.

Extent, Boundaries, Areas, and Populations

ECUADOR, smallest of the Andean republics, takes its name from the equator, by which its northern provinces are intersected. On the west it is limited by the Pacific Ocean for a distance of nearly 500 miles between Colombia and Peru, the conterminous northern and southern states. The same states, together with Brazil, converge and even overlap about the eastern frontiers, where extensive tracts have formed matter of contention between all these countries during the nineteenth century without any prospect of immediate settlement. So vast are these almost uninhabited tracts, that, according as the boundaries may be eventually laid down, the superficial area of Ecuador may vary as much as from about 100,000 to 250.000 and even 300,000 square miles. But the

interests involved are, at least for the present, far from commensurate with these dimensions, and the negotiations are carried on in such a listless way that, whenever the diplomatists happen to agree upon some knotty point, the Congress of one or other of the litigants is sure to reject their decision. Thus a Boundary Treaty, arranged between Peru and Ecuador in 1890, was amended by Peru in 1893, and revoked by Ecuador in 1894, and since then nothing had been done till 1904, when Ecuador and Colombia submitted their boundary disputes to the German Emperor for settlement.

It may be stated in general that towards the east Ecuador claims nothing beyond a conventional line drawn from Tabatinga, last Brazilian station on the Solimôens (Amazon), northwards across the lower courses of the Putumayo, Napo, and Japura to the equator, this line, which coincides with the meridian of 70°, 30′ W. Gr., forming the boundary towards Brazil, and presenting two fixed points for determining the southern and northern frontiers towards Peru and Colombia. But, pending its acceptance and the settlement of the other points in dispute, the area of Ecuador may be taken at about 116,000 square miles, with a population of 1,205,000 distributed over the seventeen provinces (including the Galapagos Archipelago) as under:—

Provinces.	Area in sq. miles.	Population (est. 1898).
Carchi	1550	36,000
Imbabura	2500	68,000
Pichincha	6450	205,000
Léon	2750	109,000
Tunguragua	1750	103,000
Chimborazo	3100	122,000
Bolivar	1200	43,000
Cañar (Azogues)	1570	64,000
Carry forward	20,870	750,000

Provinces.	Area in sq. miles.	Population (est. 1898).
Brought forward .	20,870	750,000
Azuay	4,000	132,000
Loja	3,800	67,000
Esmeraldas	5,660	14,600
Manabi	8,170	64,100
Los Rios	2,310	32,800
Guayas	8,500	98,100
Oro	25	32,600
Oriente	100,000	12,600
Galapagos	2,970	400
Total . .	156,305	1,205,600

In Ecuador the proportion of full-blood and independent aborigines is far greater than in any other Hispano-American state, Bolivia not excepted. The "whites," which in official language has a somewhat elastic meaning, are "estimated" at about 100,000, although "it is said that such a thing as a Spanish family of perfectly pure descent is not to be found in the country" (Whymper, p. 178). The Mestizos are reckoned at 300,000, while all the rest are classed as "Indians." A chief difference between the whites and Mestizos is that the former are of Spanish speech, while many of the latter, as well as some of the Indians, speak both their own language and Quichua, which, in the Andean regions, has become the *lengua general*, corresponding to the *lingoa geral* of Brazil.

It is also to be noticed that a distinction is drawn between these Quichua-speaking natives, who are also salt-eating semi-Christians, and to whom the term "Indios" is restricted, and the "Infieles" or "Aucas," that is, the real wild tribes, infidels, traitors, rebels, in fact everything that is bad, who eat no salt, are pagans, speak no Quichua, and recognise no authority except that of their own chiefs. They occupy the greater part of the

province of Oriente, that is, about two-thirds of the whole country, comprising the debatable lands sloping to the Amazon, while the more or less settled populations are mainly confined to the western uplands between the Amazon basin and the Pacific Ocean, that is, the Ecuadorean Andes.

Relief of the Land—The Eastern Cordillera and Pacific Coast Range

In the history of geodetic studies Ecuador holds a somewhat eminent position. It was visited in the eighteenth century by a party of savants—La Condamine, the brothers Alloa, and others—who were commissioned by the French Academy of Sciences to measure an arc of the meridian on this section of the Andean plateaux and Cordilleras, which were at that time supposed to be the highest on the globe. Besides the measurement of the arc much other useful work was accomplished, and since then the country has been explored by several other distinguished men of science, notably A. von Humboldt and Bonpland early in the nineteenth century, and later by Villavicencio, Reiss and Stübel, T. Wolf, and Mr. E. Whymper, and Hans Meyer. In 1900-1906 remeasurements of the meridian arc were again undertaken with satisfactory results. Between the Knot of Loja towards the Peruvian frontier, and the Knot of Pasto within the Colombian frontier, the Andean system is commonly supposed to develop two somewhat parallel cordilleras, converging at both points, and thus enclosing the elevated Ecuadorean plateau between two continuous mountain barriers. About the existence of the eastern branch, which is here often called the "Royal Cordillera," and traverses the country for over 300 miles in the direction

from south to north, there can be no doubt. It does not, however, form an unbroken divide between the Pacific and Amazon basins, for it is pierced by the head-streams of at least two of the Amazonian affluents, the Pastasa and the Paute, rising within 35 miles of the Pacific, far to the west of the eastern range.

The very existence of the western "parallel chain" is denied by Mr. Whymper, who, however, admits the presence of a parallel ridge, which he calls the "Pacific Range of Ecuador," a range 65 miles long by 18 to 20 wide, enclosed on the east and on the south by the valley of the Chimbo affluent of the Rio Guayas, with a general elevation in some places of 10,000 feet, above which rise peaks 13,000 to 14,000, and probably even 15,000 feet high. This range, which on the Pacific side is densely wooded up to the crests, while almost bare of vegetation on its eastern slopes, is crossed on the route from the coast to the interior by a pass, which at Tambo Gobierno attains an extreme height of 10,417 feet above sea-level, and, when seen from the upper slopes of Chimborazo, presents a panoramic view of countless peaks and ramifying crests—"valleys, vallons, dells, and dales, backed by the ocean, rising above the haze which obscures the flat coastland" (Whymper, p. 324). It is separated on the north by a large and deep valley from the huge mass on which stands Chimborazo, culminating summit of Ecuador, and would therefore appear not to belong to the Andean system proper. At least it "lies *outside* the main chain of the Andes," and "has nothing to do with the 'two parallel cordillers'" (*ib.* p. 336). At its western foot is the somewhat narrow strip of Pacific lowlands, and on the east stretches the central plateau of Ecuador, which is here furrowed by numerous small river valleys converging towards the head of the

Rio Chimbo at an altitude of 10,000 feet, or about 1000 feet more than the mean height of the plateau. Owing to this general elevation of the land, the numerous peaks and cones that rise several thousand feet higher do not present the same Alpine character that many smaller masses do when viewed from lower levels. The transverse ridges, which have been compared to the broken rungs of a ladder disposed irregularly between the framework, are nowhere seen in clear or sharp outline, and the whole of the interior is rather hilly than mountainous, with long stretches of moorland, and broad flat or slightly undulating plains, the so-called "basins," such as those of Riobamba, Machachi, and Tumbaco.

The Avenue of Volcanoes

Thus "the two parallel Cordilleras, which, according to geographers, are the great features of the country, do not exist. The axis of the Andes of Ecuador, part of the backbone of South America, runs nearly north and south; and towards the western edge of the main chain there *is* a certain sequence of peaks more or less in a line with each other. On the east of these summits there is a succession of basins of different dimensions and of various elevations, and the nearest mountains on the eastern side occur at *irregular* distances. There is no such thing as one great valley in the interior of Ecuador" (*ib.* p. 336). But if the parallel chains have thus to be removed, the "sequence of peaks" on both sides stands out all the more conspicuously, and constitutes that magnificent "avenue of volcanoes" which is unrivalled for magnitude and sublimity in the whole world. Here are grouped as many as twenty crests and a much larger number of peaks, cones, and domes over 15,000 feet high,

SUMMIT OF CHIMBORAZO.

and consequently penetrating into the region of eternal snows, all rising out of or upon and above the main chain, and all with the exception of *Sara-urcu* of igneous origin. "Here are volcanoes and volcanic productions in every stage. Immense plains of volcanic sand, mountains and vales of tuff and scoriæ—in some of the lower strata of which are embedded numerous animal remains of the Quaternary period—streams of lava, fields of pumice, and the great cones themselves; some extinct, others smoking and dormant, and one [two] *Sangai* [and *Cotopaxi*] in unceasing activity, all ready to break out again and devastate the country around them, as they have so often done before."[1]

Subjoined is a table of some of the higher summits in the western and the eastern ranges, with their heights, as determined by MM. Reiss and Stübel and Mr. Whymper:—

Western Summits.	Height in ft.	Eastern Summits.	Height in ft.
Chimborazo	20,498	Cotopaxi	19,613
Illiniza	17,405	Cayambe	19,186
Carihuairazo	16,515	Antisana	19,335
Cotocachi	16,301	Altar	17,730
Corazon	15,871	Sangay	17,464
Guagua-Pichincha	15,918	Tunguragua	16,690
Rucu-Pichincha	15,542	Sincholagua	16,365
Rumiñagui	15,607	Sara-urcu	15,749
Mojanda	14,088	Imbabura	15,033

Chimborazo

Although lying on or about the equator, several of these giants are not only snow-clad, but also scored by glaciers, which feed numerous torrents tumbling down to the plains. Such are Cayambe, Cotopaxi, and especially

[1] Alfred Simson, *Travels in the Wilds of Ecuador*, p. 43.

Chimborazo, first ascended in 1879 by Whymper, who found that glaciers are discharged by all the upper combes encircling the ice-capped crater. Others have even in recent times been the theatre of tremendous convulsions, such as that of 1868, when whole towns and villages were levelled with the ground, and 50,000 persons perished in the Cotocachi and Imbabura districts. Dr. Hans Meyer, who ascended Chimborazo and explored the Ecuador glaciers in 1903, found that these were formerly far more extensive, reaching 2500 or 3000 feet below their present limits.

Tunguragua—Altar

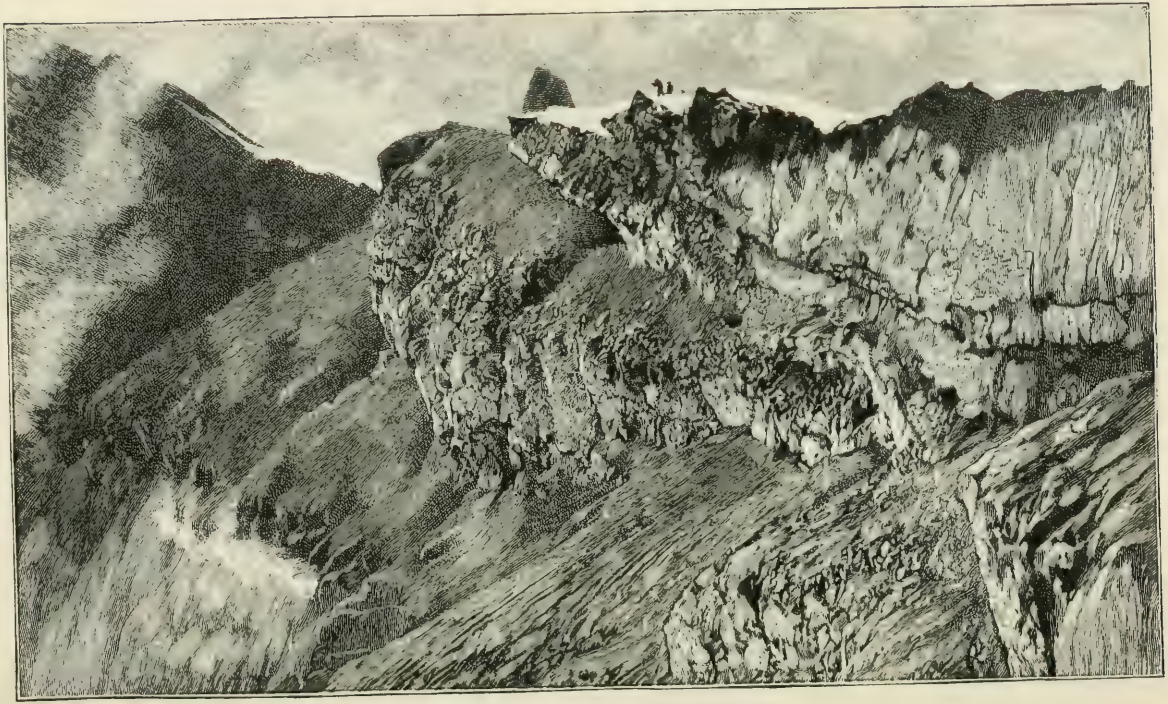
Conspicuous amongst the snowy cones of the eastern range are the wooded Tunguragua and Capac-uru, "King of Mountains," the Altar of the Spaniards, which fourteen years before the conquest was said to be still somewhat higher than Chimborazo. But it has since collapsed, and now presents the appearance of a superb jagged and rocky crown, whose dark-blue *barrancas,* that is, rents or fissures in its snowy mantle, offer a spectacle the eye is never wearied of gazing upon.

South of Altar rises the ever restless Sangay, and away to the north the superb Antisana, at whose foot is the *hacienda* or wayside inn immortalised by Humboldt's visit, at an altitude of 13,300 feet above sea-level, that is to say, over 1000 feet higher than the Peak of Teneriffe. This hacienda, however, is not, as is often stated, the highest abode of man in South America, the Bolivian mining town of Potosi standing about 20 feet higher.

Cotopaxi

On the eastern horizon over against Illiniza towers the majestic Cotopaxi, which is without a rival amongst the active volcanoes of the Old World. In the perfect symmetry of its outlines Cotopaxi is unsurpassed not only by any South American volcano, but has elsewhere no equal except perhaps Fuji-yama in Japan. "It is turned as if with the lathe," said the natives to Humboldt, while Orton describes it as a huge cone rising out of the valley, its sides deeply furrowed by the torrents of slush which have so often been vomited from the crater. The cone itself is about 6000 feet high, its eastern side being snow-clad, while its western is nearly bare, a contrast due to the Atlantic trade-winds which, sweeping up the Amazons valley, deposit their moisture in the form of snow on the slopes facing eastwards.

Cotopaxi was for the first time scaled in 1880 right up to the crater by Mr. Whymper, who, contrary to Halls' experience, found that much of the ascent was a mere walk, no climbing being necessary. He describes the crater as an amphitheatre 2300 feet from north to south and 1650 from east to west, with a rugged crest surrounded by overhanging cliffs, some snow-clad, others apparently encrusted with sulphur. "Cavernous recesses belched forth smoke, the sides of the cracks and chasms no more than half-way down shone with ruddy light, and so it continued on all sides right down to the bottom, precipice alternating with slope, and the fiery fissures becoming more numerous as the bottom was approached. At the bottom, probably 1200 feet below us, there was a ruddy circular spot, about one-tenth of the diameter of the crater, the pipe of the volcano, its channel of communication with lower regions, filled with incandescent



INTERIOR OF THE CRATER OF COTOPAXI.

if not molten lava, glowing and burning, with flames travelling to and fro over its surface, and scintillations scattering as from a wood-fire, lighted by tongues of flickering flame which issued from the cracks in the surrounding slopes" (*op. cit.* p. 153).

Steam undoubtedly plays a large part in the convulsions of Cotopaxi, and the quantity emitted is occasionally prodigious. From the slopes of Cayambe, at a distance of about 60 miles to the north-east, Mr. Whymper saw a volume of steam ejected, which formed "a continuous body of not less than sixty cubic miles of cloud." Colonel Church thinks that these peaks must have magnetic attraction for each other, and on one occasion watched two storms rising simultaneously, one round Chimborazo, the other from the summit of Cotopaxi, 50 miles distant. "Blacker and denser grew the frowning clouds, until their artillery opened fire and echo after echo pealed along the Andes. Suddenly through the highly-electrified atmosphere Chimborazo shot a hissing bolt straight for Cotopaxi, which in turn launched one at Chimborazo. Then, for perhaps twenty minutes, with a mighty and ceaseless roar, they hurled their well-aimed lightnings at each other, until the battle-clouds dispersed." (*Geograph. Jour.*, 1901, i. p. 342).

Hydrography—The Rios Guayas and Esmeraldas

If, as is generally supposed, the basins of the central plateau were formerly a group of upland lakes at varying altitudes, their contents have long been discharged through the streams flowing east to the Amazon and west to the Pacific. The Pacific drainage is effected by several rivers whose basins lie all within the territory of the republic, but of which two only—*Guayas* and *Esmeraldas*—are of any importance.

The Guayas, which collects the surface-waters of an area estimated at about 14,000 square miles, is formed by the convergence of a large number of head-streams, such as the *Chimbo* or *Yaguachi*, which sweeps round from the eastern slopes of the Pacific range; the *Daule*, which winds through the flat marshy tracts on the right bank; and the *Babahoyo*, which rises in the Pacific range, and is regarded as the true upper course. Below Bodegas, the "stores," that is, the depôt for goods in transit and landing-stage for travellers mounting to the plateau, the main stream expands to a breadth of half a mile, and at Guayaquil, a little lower down, merges in an estuary, which is the largest inlet on the west coast of South America. The Guayas, which is navigable for large steamers as far as Bodegas, swarms with alligators, and Mr. Simson tells us that he counted as many as five hundred basking in the sun on a sandbank exposed at low water. The river is of vital importance to Ecuador, its valley, rough as it is, being almost the only route which gives access to the Pacific coast.

The Esmeraldas, whose upper course is the *Guallabamba*, traverses the plain of Quito in a north-westerly direction to the little seaport of Esmeraldas below the Colombian frontier, and is also navigable for a short distance. Its basin has an area of nearly 9000 square miles, but this route is little used, the country being mostly uninhabited, and the fluvial valley obstructed by a tremendous gorge 2000 feet deep at the base of the Mojanda volcano.

The Rio Pastasa

That section of the Amazon, which receives contributions from the Ecuadorean uplands, flows normally in an easterly direction as far as Tabatinga on the Brazilian

frontier, and might well serve as a convenient boundary between Ecuador and Peru. Besides the already mentioned Paute, the affluents of this section which traverse Ecuadorean territory are the *Pastasa* and the *Napo*, both rising on the plateau, and about midway between these two the *Tigre*, which has its source on the advanced out-runners of the Royal Cordillera. All three have a nearly parallel south-easterly trend, and all flow for most of their course through the wilds of the province of Oriente, which are still mainly occupied by independent native tribes classed in Ecuador as "Infieles" or "Aucas." The Pastasa is formed by the junction of the *Patate* from the northern plateau and of the *Chambo*, which has its source on the high land of Alausi, and after a winding course along the western slopes of Sangay and Altar bends round the base of Tunguragua to the confluence just above Baños. From this point the Pastasa flows through a deep valley with steep sides, down which rush the *Topo*, *Zuiñag*, *Rio Verde*, *Bobonaza*, and several other torrents descending from the Llanganati heights to the left bank. The Pastasa strikes the north bank of the Marañon, as the Amazon is here called, some miles above the confluence of the Huallaga from Peru, and over 3000 miles from the Atlantic.

The Rio Napo

North of the Bobonaza all the streams having their source in the Ecuadorean Andes converge to form the *Napo*, which may almost take rank with the great affluents of the Amazon. The chief headwaters of the main stream, which springs from the eastern slope of Cotopaxi, are the *Curarai*, draining the northern slopes of Llanganati; the *Coca*, rising between Antisana and

Cayambi; and the *Aguarico*, descending from the north-eastern flanks of Cayambi. From its source to the confluence of the Coca, almost as large as the main river, the Napo runs in a rough stony bed at a steep incline; but beyond its junction with the Aguarico on the left and the Curarai on the right, it flows in a smoother but still rapid current between low wooded banks, and after a course of 750 miles is lost in the waters of the Amazon 500 miles below the Pastasa confluence. Here the Napo is broader than the Thames at London Bridge, and from its mouth to the Curarai junction presents for several hundred miles an easy navigable waterway through the province of Oriente.

Beyond the Napo follows the *Putumayo*, the *Içá* of the Brazilians, which, however, rises in Colombia and has its outflow at S. Antonio in Brazil, while no part of its course lies in undisputed Ecuadorean territory. The whole region traversed by these western tributaries of the Amazon forms a continuation of the southern woodlands, which in Peru take the name of *la montaña*. But the Ecuadorean montaña is more abundantly watered, for the climate is one of excessive humidity and continuous rainfall, rendering the few forest tracks often as impassable as treacherous quagmires. Here the trees grow to a greater height than on the lower Amazonian plains, and shoot up perfectly straight from the saturated soil. Their shady branches are draped with long hoary mosses and festooned with orchids and other parasitic plants.

Climate

The succession of vertically superimposed climatic zones, common to all the western uplands, is greatly modified in Ecuador by the local conditions. In deter-

mining the general distribution of heat and moisture the chief factors are the position of this section of the Andes and their eastern slopes in respect of the Amazon valley, and the main trend of the Royal Cordillera at right angles with that valley.

The whole of the montaña, that is, the province of Oriente, together with the eastern slopes of the Cordillera, comes within the direct influence of the heavily-laden clouds rolling up from the Atlantic with the perennial trade-winds. Much of the humidity is discharged on the Amazonian plains themselves; but enough remains not only to keep the montaña in a perpetual state of saturation, but also to reach the plateau, where it is precipitated in the form of snow on all the higher crests, and as rain lower down the eastern slopes of the Cordillera. The summits of the great volcanoes are wrapt in dense fog for months together, and travellers, after long waiting for a glimpse of their glittering cones, are told that thus they live year in year out.

On the Pacific slope the rainfall, nowhere heavy, decreases normally in the direction from north to south, so that the southern districts about the Guayas estuary, and the island of Puna at its entrance, come almost within the Peruvian rainless zone, and may in any case be described as arid. But here as on the montaña the heats are tropical, with a mean temperature of 79° to 82° Fahr., while on the plateau, as at Quito, Cuenca, and Riobamba, it falls to 58° and even 56° Fahr. The plateau, being mostly sheltered by the encircling ranges, is also much drier than the montaña, and even at Quito, which receives some moisture through the Esmeraldas rift from the Pacific, the annual rainfall averages not more than 47 inches.

It results from these general remarks that, apart

from the Alpine heights and the more elevated wintery paramos, there are in Ecuador three tolerably well-defined climatic zones, corresponding to the three physical zones —the montaña, essentially tropical, that is, hot and moist; the plateau, temperate with moderate heat and rainfall; and the seaboard, hot and dry. It follows also that the normal succession of the two seasons—dry from about June to January, and wet for the rest of the year—is less clearly marked in Ecuador than in most other tropical regions. On the plateau great perturbations are caused by the large number of snowy mountains, while on the eastern slopes there is no succession at all. Here, say the natives, "it rains thirteen months in the year."

Flora

Thanks to this superabundance of moisture, the *sabanas*, that is, the open dry tracts, answering to the Venezuelan llanos, are confined in Ecuador to the western lowlands, where they alternate with artificial clearings for the cultivation of coca, cotton, fruits, and sugar. In the vast province of Oriente "all is covered by the same dense, impenetrable forest, where the vegetable kingdom truly lives a life of struggle for existence, the fittest living and thriving upon the death and decay of the weaker" (Simson). But forest growths are by no means confined to the montaña, and extensive wooded tracts occur on the eastern flanks of the Cordillera, on the west side of the Pacific range and in the Esmeraldas basin. The route from Guayaquil to Quito leads over the spurs of Chimborazo through sublime mountain scenery and verdant river valleys, amongst which that of the Chimbo is especially celebrated. At this elevation the cultivation of wheat supplants that of the sugar-cane, while cacao

and orange groves have given place, the one to barley, the other to clover-fields, lucerne, maize, and beans. Guaranda, at an altitude of 8840 feet, is the centre of the Peruvian bark trade, which, however, will here soon be a thing of the past, as the trees are being rapidly destroyed by the wasteful way of obtaining the bark. That of the much-prized *Cinchona calisaya* is now no longer to be had, that of *C. succirubra* being alone procurable. This is a majestic tree, growing to a height of 50 or even 60 feet, clothed with bright dark-green oval leaves, and bearing a white flower with an aromatic fragrance A fresh stem 5 feet in girth yields 1500 lbs. of red bark, which, however, during the drying process is reduced to 800 lbs.

But the most valuable plant in Ecuador is the cacao tree (*Theobroma cacao*), which thrives best on the hot moist lowlands beneath the shade of taller growths. Hence the low-lying districts of this region are admirably suited for its cultivation, which has become one of the chief industries of the inhabitants. Here the white species, which is the best, still runs wild, and is peculiar to Ecuador.

Fauna

In Ecuador are represented all the large fauna of the neighbouring regions. Even the llama ranges as far north as the Riobamba district, beyond which it is replaced by the mule as a pack-animal. As in Colombia, a peculiarity of the local fauna, and especially of the birds and insects, is the curious tendency of certain species to confine themselves to small areas. Like the Sierra de Santa Marta, several of the Great Andes might in this respect be described as little independent zoological kingdoms. Such are Antisana, which has a species of

ibis (*Theristicus caudatus*) unknown elsewhere; Chimborazo and Pichincha, each with a peculiar variety of the humming-bird occurring at an altitude of over 14,000 feet, while on Pichincha Mr. Whymper also discovered eight absolutely new species of beetles. Ecuador is extremely rich in these insects, of which as many as 8000 species have been recorded.

In the eastern woodlands is heard the soft musical note of the *flautero* or "flute-bird," which is a constant surprise and delight to travellers in the province of Oriente. "His song is not quite the same in all individuals, but may be likened in tone to the most mellow, sweet-sounding flute; and the musical correctness of all his notes is astonishing. He is a very insignificant-looking, little grayish-coloured bird; and, I was informed, always dies in captivity" (Simson, p. 84).

These eastern forests, which are continuous with those of the Amazonian plains, afford cover to numberless tapirs, jaguars, pumas, peccaries, venomous snakes in endless variety, bloodthirsty insect pests, such as mosquitoes, the red tick, the horrible pium fly, and, perhaps the greatest plague of all, true vampires in great variety and abundance. Some of the popular stories connected with these repulsive winged mammals may be too highly coloured, but there is no longer any doubt as to their blood-sucking propensities. "The depredations of these bloodthirsty imps fall heaviest upon children, whose blood they seem to have a special liking for. I have seen a little Zaparo child at Aguano perfectly pale, anæmic, and debilitated by constant loss of blood from the head and feet; and was told of more than one case of children entirely succumbing to the attacks of vampires. By the foregoing it will be seen that the depredations of the vampire are not a mere 'myth of imaginative

travellers,' as Professor Orton, in *The Andes and the Amazons*, describes them" (*ib.* p. 133).

Inhabitants—The Quitus and Caras

With Ecuador we enter the domain of the Quichua race, which was already in possession of the northern

COCONUCO INDIAN OF COTOCACHI, ECUADOR.

(See the description of this tribe on p. 134.)

coastlands and of the plateau long before the conquest of the country, begun by the Inca Tupac-Yupanqui, and completed by his son Huayna-Capac. Whether the *Quitus*, that is, the earliest known inhabitants of the ancient kingdom of Quitu (Quito), were a branch of the Quichua race, is doubtful. But to this connection almost

certainly belonged the *Cara* (*Caran*) people, who overthrew Quitu, last king of the prehistoric dynasty, from whom the Quitus and their capital were afterwards named.

The Caras came traditionally on rafts (*balsas*), apparently from Peru, formed settlements on the coast below the Rio Esmeraldas, and thence ascending to the plateau conquered the kingdom of Quitu. Here they established the pre-Inca dynasty of the so-called Shyris, the last of whom, fifteenth in succession from the founder, fell on the battlefield of Hatuntaqui in 1487, when the whole region became an integral part of the Peruvian Empire. Its fusion in the political system of the Incas was all the more easily effected since the Caras were an allied race, who spoke a dialect of the Quichua language, which is still the common speech of a great part of the inhabitants of the plateau and Pacific seaboard.

The Caras and nearly all the other aborigines of the uplands have long been merged in the general Mestizo population, in which the Spanish element is but slightly represented. Hence the Quiteños, as the inhabitants of the plateau are often called in a collective sense, reflect in their daily life and social habits the old Quichuan culture almost more than that grafted upon it by the Spaniards. Indeed, some of their customs are quite barbarous, and are a source of constant amazement to strangers passing through the country. It is curious to read of the capital of a "civilised" state being dependent for its supply of water on the public fountains, and their basins contaminated by all sorts of abominations, while the over-fastidious have twopennyworth brought every morning several miles in large pots. The houses of Quito are also destitute of hearths and chimneys, and the same primitive conditions characterise all religious and com-

mercial affairs. Under an outward show of Christianity the old pagan notions still persist, and in the altar-pieces representing St. Michael vanquishing the devil, everywhere a favourite motive, both Archangel and dragon are worshipped with equal fervour.

In the religious processions scenes are witnessed

WATER-CARRIERS OF QUITO, ECUADOR.

which almost recall the ceremonies preceding the sanguinary rites of the old Aztec teocalli. These processions are followed not only by dancers, mimes, and masqueraders, but also by the so-called *chacatascas* or public penitents, who, like the flagellants of the Middle

Ages and the Indian fakirs, lacerate their half-naked bodies with an endless variety of self-inflicted tortures.

The Jivaros

In the province of Oriente much the same ethical relations prevail as in most other unreclaimed Amazonian lands. Here the Indios, or Christian natives, are not numerous, being chiefly represented by the *Qujos* or *Canelos*, settled about the missions of the Upper Napo and its headwaters. All the rest—*Jivaros* of the Pastasa, *Zaparos* of the Napo and its southern affluents, *Piojés* of the Aguarico, Middle Napo, and Putumayo, *Iquitos* and *Mazanes* of the Tigre, Nanai, and Lower Napo—are still "Aucas" or "Infieles," rude wild tribes at various stages of savagery, just as at the time of the discovery.

Some of the Jivaros, who formerly ranged west to the Paute, were converted and even reduced by the Spaniards, who founded settlements in their midst. But in 1599 they all rose in a body and destroyed all these settlements in one day. The Jivaros are a brave, freedom-loving people, who can endure no servitude, but are advanced enough to till the land and raise crops of maize, beans, yucas, and plaintains, while the women are expert weavers. Like the negroes of West Africa, they have a drum-language, and in every village there is a *tunduli* or great drum, which summons to arms, and issues other signals, rapidly propagated far and wide. They also preserve the scalp of the enemy, removing it in one piece from the neck upwards, and drying it with hot stones in such a way that the skin shrinks to about the size of a Jaffa orange, while retaining the features of the victim. They are very proud of these ghastly trophies, specimens of which may be seen in several European museums.

The Zaparos

In the Napo basin the dominant people are the Zaparos, who occupy a territory about the size of Wales between the Napo and the Pastasa. They are very numerous, or, at least, are broken into numerous subgroups, of which as many as thirteen are mentioned by C. D. Taylor. Of these some, especially the *Ahuishiris*, are fierce, irreclaimable savages, while others, perhaps the majority, have the reputation of being gentle, hospitable, and well disposed towards Europeans, although living in a state of constant feud among themselves. Like the Guarani, to whom they may possibly be remotely allied, they have a Mongolic expression, with small slant eyes, thick flat nose, thick lips, and round, beardless face.

Amongst the Zaparos an echo would appear to survive of the Shamanistic religion so widely diffused over North America and Siberia. Like the *shaman* of the Tunguses, their *shimanu* is a true mediator between the good and evil spirits, with whom they hold commune during delirious trances brought on by drinking the *ayahuásca* or divining liquor. They also perform conjuring tricks, and, like the Australian medicine men, extract the darts which some enemy is supposed to have stuck into the body of people suffering from any pain or ailment. But Mr. Simson does not think they are imposters, but rather, by constant repetition, come to acquire a kind of superstitious belief in their own deceptive practices.

The Piojes and Papallactans.

On the Napo and its Aguarico affluent also dwell the Piojes, who are akin to the Macaguajes of the Putumayo. Although classed as Aucas, those who come in contact

with traders disclaim the title, and call themselves Christians, meaning, perhaps, civilised or settled, and not merely wild tribes like their Zaparo neighbours. From these they differ greatly in dress, arms, and many customs, and are certainly far more civilised, as they not only cultivate the soil, growing large crops of cassava and plaintains, but also own a large breed of dogs well trained for the hunt. The natives of the neighbouring Papallacta district may fairly be called dwarfs. Mr. A. H. Rice, who interviewed them in 1901, tells us that the men are under 5 feet, "and the women considerably less; 4 feet would be a good height, and a few inches under this is common." Another peculiarity is the femur, which, instead of being the longest bone in the body, is slightly shorter than the tibia, as amongst the Aymaras of Bolivia (*Geograph. Jour.*, April 1903).

History—Colonial Rule

After the conquest of the country by the Incas (see above) Quitu was not reduced to a mere dependency or outlying province of the Peruvian empire, but the old kingdom was reconstituted as a separate state, independent of, and at times even hostile to the central government. Indeed, one of the immediate causes of the downfall of the Incas was the rivalry of the two states, which had been engaged in open warfare just before the Conquistadores arrived on the scene, and almost at a single stroke destroyed both branches of the old dynasty of the Incas.

On the death of the last of the Shyri rulers, Huayna-Capac is said to have arrested further resistance by marrying that monarch's daughter, Pacha, and taking up his residence in Quitu. Moreover, he destroyed the unity of the empire by leaving Cuzco (Peru) to the legitimate heir,

Huascar, and Quitu (Ecuador) to Pacha's son, Atahualpa. The two half-brothers soon fell out, and Atahualpa had just defeated and captured Huascar when he was himself treacherously seized and put to death by Pizarro (1532).

The transition from native to Spanish rule was marked by the foundation of the present city of Quito by Belalcazar in 1534. But the first governor of the province was Gonzalo Pizarro, appointed in 1540 by his brother Francisco shortly before his assassination. After Gonzalo's execution in 1550 the province of Quito became a Presidency under the viceroys of Peru, and, except for a short interval when it was transferred to Bogotá (1710-22), remained an administrative dependency of Peru during the Colonial period. Under the oppressive Spanish rule, the chief event was the terrible earthquake of 1797, which rent the continent from Cuzco to Panama, and in a few seconds destroyed 40,000 persons in Quito alone.

The Republic

The people were unprepared for self-government when Ecuador was constituted an independent state. The new republic was, however, governed well during the first fifteen years of its existence, under the able administrations of General Flores and of the accomplished scholar and statesman, Vicente Rocapuarta. There were troubles during some of the succeeding years, until General Flores returned in 1860. Under Garcia Moreno the priests obtained undue influence for fifteen years. But since 1890 there has been no revolution, and Eloy Alfaro, elected in 1896, was re-elected *ad interim* in 1906.

Topography

In Ecuador the urban groups are all concentrated on the plateau, and along the main route leading from the coast to the interior. Despite earthquakes and political disorders Quito, the capital of the State, has a population estimated at about 80,000, but according to Whymper not more than 35,000, mostly Mestizos, with a few whites, and in the suburbs a considerable number of pure Indians. It stands at an altitude of 9343 feet, near the source of the Esmeraldas, under the shadow of Pichincha. It is laid out in the form of a perfect square, with a few straggling environs, and may feel prouder of its fine Renaissance churches than of its ill-paved streets. A great part of the city is covered with churches and convents, which contrast strangely with the mean and dilapidated appearance of most of the houses. One of the chief local industries is the execution of oil-paintings, mostly religious subjects, which are largely exported to the surrounding countries. Another speciality are the dried skins of birds, especially those of humming-birds, brought in from all parts, but chiefly by the Indians from the river Napo. The Indians also bring to Quito the well-known vegetable-ivory nuts, which are carved by the local artists into rude little figures, painted in bright colours, and sold to the country people.

From Quito the main route leads between the Avenue of Volcanoes southwards to all the large towns on the plateau—*Latacunga* and *Ambato*, not far from Chimborazo, each with about 10,000 inhabitants; *Riobamba*, near the source of the Pastasa, west of Altar; *Alausi*, south-west of Sangai; *Cuenca*, far to the south in the upper Paute basin; and *Loja* in the same basin, but much nearer the Peruvian frontier. Cuenca may have a population of

45,000 and Riobamba of 18,000, while that of all the others falls probably below 10,000. They stand at elevations ranging from about 8500 to a little over 9000 feet, and with their low cheerless houses, dusty or else muddy streets, and unlovable surroundings, present the same general aspect of hopeless dreariness.

But noble buildings, spacious thoroughfares, and other civic attractions can scarcely be looked for in an im-

GUAYAQUIL.

poverished land, where whole cities may at any moment be buried beneath a treacherous soil, or overwhelmed by some sudden display of volcanic energy. Such was the fate of *Cacha* near Riobamba, which, with its 5000 inhabitants, was swallowed up in 1640 in a still yawning chasm. Riobamba itself was destroyed in 1797, and has been rebuilt on a new site less exposed to such disasters.

Perhaps the largest and almost the most important place in the whole country is the seaport of *Guayaquil*,

at the head of the Guayas estuary, where is centred nearly all the foreign trade of Ecuador. It was founded by Belalcazar in 1535 near the old Indian city of *Culenta*, with which it was connected across swamps and backwaters by a causeway nearly half a mile long. *Duran*, opposite Guayaquil, which has a reputed population of 50,000, is the seaward terminus of the railway running thence through Latacunga to Chasqui, within forty miles of Quito, to which it is to be continued. Several other lines have been undertaken, and that from Puerto Bolivar to Machala was nearly finished in 1908. Guayaquil is accessible at low water only to small vessels; but harbour works—docks, wharfs, and other facilities for traffic—were completed in 1908, and the port is now regularly visited by several lines of European and American steamers. In 1906 nearly 200 ships of 360,000 tons entered and cleared this port.

Resources—Land Tenure

The resources of Ecuador, if inferior to those of Peru and Colombia, are by no means despicable. The emeralds, which gave their name to the Esmeraldas river, are no longer found. But the profitable gold-washings in this wonderfully fertile low-lying Esmeraldas valley are proof enough of the presence of rich auriferous quartz-reefs on the uplands. At present the chief mine actually open is that of Zaruma, which yielded gold to the value of £18,000 in 1905. Silver, copper, zinc, and iron also occur.

Agriculture is in a rudimentary state; there are no ploughs anywhere to be seen, and in some districts the corn is still thrashed by the primitive process of "sabot-

dancing." Hence it is not surprising that a land, which might yield enough for the wants of twenty times the present population, is still largely dependent on California and Chile for its supply of wheat and flour.

This backward state of the agricultural interests is no doubt partly due to the constant political ferment which drives off capital, but also in great measure to the feudal system of land tenure. The whole country belongs to a few absentee owners, whose estates are often of boundless extent. Thus one great lord owns the whole of Cayambe, with Sara-Urcu and all the intervening plains and valleys. Another is master of Antisana with all its farmsteads, pastures, and live-stock, and he is himself ignorant of the extent of his domain, which stretches for an unknown distance eastwards in the direction of the Amazon.

Administration

The republic is constituted much in the same way as that of Colombia, with a centralised authority, and provinces administered by governors, who are appointed by and are directly responsible to the State. By the Constitution of 1884, modified in 1887, the President and the Vice-President are both elected by the people for four years, and perform their functions through a Cabinet of five ministers, who, as well as the President, may be impeached by Congress. This legislative assembly consists of a Senate with two members for each province chosen for two years, and a Chamber of Deputies also chosen for two years in the proportion of one for every 15,000 inhabitants. The franchise is limited to adults who can read and write, and are Roman Catholics.

Not only is the Catholic the State religion, but no other cult is tolerated. Primary instruction is both free

and obligatory, and for the higher education there is a University at Quito, besides University bodies at Cuenca and Guayaquil, and nine High and thirty-five Secondary Schools. In 1907 the total attendance was over 68,000, the instruction imparted being strictly "orthodox."

The Galapagos Islands.

This interesting group of islands belongs politically to Ecuador, but being but sparsely inhabited, is administered as a "territory." It lies due west of Quito, being crossed towards the north by the equator, and consists of nine or ten islands of varying size, but all of volcanic origin. The surface is generally bare and arid, although a few cone-shaped hills, ranging from 1600 to about 3600 feet, are covered with grass, thanks to the mists in which they are generally wrapped. The chief members of the Archipelago are Albemarle, the largest (1710 square miles), Chatham, Narborough, Indefatigable, James, Hood, and Charles I. or Floreana, with a total area of 3170 square miles, and a population of less than 500, mostly concentrated in Chatham. When discovered by Tomas de Berlanga in 1535 the group was found to be uninhabited, but was afterwards resorted to by buccaneers, whalers, and even a few settlers from Ecuador. The cotton, tobacco, fig, orange, plum, and other plants introduced by these colonists now run wild, as do also the cattle, horses, asses, pigs, cats, dogs, goats, and poultry.

But for zoologists the chief interest attaches to the indigenous animals—birds and reptiles—which when examined by Darwin during the voyage of the *Beagle* were found to be distinct species unknown elsewhere. Of the twenty-five kinds of land birds described by the

ECUADOR

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80°
75°
70°
0°
5°
South Latitude
Longitude West 75° of Greenwich
PACIFIC OCEAN
GULF OF GUAYAQUIL
ECUADOR
ESMERALDAS
IMBABURA
PICHINCHA
LEGION
MANABI
LOS RIOS
GUAYAS
CHIMBORAZO
TUNGURAHUA
AZUAY
ORIENTE
CANAR
LOJA
TUMBEZ
PIURA
AMAZONAS
LORETO
Aethonia Ind.
Xetero Ind.
Tariana Ind
Orejone Ind.
Yagua Ind.
Tiruca Ind.
Marubo Ind.
Mayuruna Ind.
EQUATOR
Cape San Lorenzo
C. Pasado
S. Helena B.
C. Blanco
Port Payta
Mangles Pt.
Ancon de Sardinas
Galera Pt.
C.S. Francisco
Pedernales Pt.
Cayapas R.
R. Esmeraldas
Pasto
Tulcan
Cotopaxi
Sangai Vol.
Tungurahua
Altar
Cayambe
Antisana
Pichincha
Napo R.
Curaray R.
Pastaza R.
Putumayo R.
Yapura R.
Iça R.
Javari R.
Iquitos
Nauta
Moyu I.
Pebas
Tabatinga
Caballococha
Maucallacta
Perualo
Arma Maranon
R. MARAÑON
Rio Samaria
Rio Jurua
Rio Purus
Rio Madeira
Rio Negro
Rio Branco
Rio Trombetas
Rio Tapajos
Rio Xingu
Rio Tocantins
Rio Pindare
Rio Gurupy
Rio Capim
Rio Guama
Rio Acara
Rio Moju
Rio Tury Assu
Rio Mearim
Rio Grajahu
Rio Pindare
Rio Itapicuru
Rio Parnahyba

great naturalist (the number has since been increased by further research) all but one proved to be peculiar to the group. Many of these were finches with remarkably broad beaks. Peculiar also were a remarkable species of turtle, a gigantic tortoise, two strange kinds of lizards, and some snakes. The nearest allied forms occur, as might be expected, in South America, from which the nearest islands are distant only 140 miles.

A remarkable circumstance connected with this isolated fauna is the restricted area of some of the forms, the finches, for instance, of one island being represented by allied but quite distinct species on another. In seeking for an explanation of these phenomena, the important fact was noticed that the islands containing such distinct species were separated from each other by deep channels with strong currents. The islands, being volcanic and rising abruptly from the abyss, must have been separately upheaved by submarine forces, and could never have since been closely connected either with their neighbours or with the adjacent Continent. They were peopled by their present species at a period sufficiently remote to allow time for much variation in the characters of the different forms. This isolated development in separate areas was one of those striking facts, which ultimately led to the Darwinian doctrine of the origin of species, and generally to the establishment of modern evolutionary teachings. It became obvious to the meanest understanding that such isolated forms, in small areas of relatively late igneous origin, could not have been specially created, but were slowly modified by natural selection and gradual adaptation to their new environment.

CHAPTER VII

PERU

Extent, Area, Population—Physical Features: Plateaux and Cordilleras—The Negra and Blanca Ranges—The Cerro de Pasco and Carabaya Range—The Volcanic Zone: Misti—Omate—Tutupaca—Underground Agencies—Thermal Waters—Varied Scenery—Local Terminology—Hydrography — The Amazon System — The Marañon and Putumayo—The Ucayali System—The Huallaga and Javari—Pacific Drainage—Lacustrine Basins—Lake Titicaca—Climate—Flora—Fauna—Inhabitants—The Cultured Peoples—The Yuncas—The Aymaras—The Quichuas—Empire of the Incas—The Uncultured Peoples—The Antis—The Chunchos—Topography—Railway Enterprise—Natural Resources: Vegetable Products; Guano; Minerals—Causes and Results of the Chilean War—The Peruvian Corporation—Administration.

Extent, Area, Population

In colonial times the Vice-royalty of Peru, so named from an obscure coast-stream the very existence of which has since been questioned, comprised by far the larger part of Spanish South America. But the long wars of independence, in which several of its dependencies played their own part, were followed by a more or less voluntary dismemberment of this vast domain, leaving to the central or Peruvian section a territory of about 750,000 square miles. Since then this area has been further reduced by readjustments of frontiers, and especially by the permanent cession of some 20,000

square miles to Chile after the disastrous war of 1879-81. Besides this loss of the provice of Tarapaca, the two provinces of Tacna and Arica were also ceded for a period of twelve years, on the understanding that their future position should then be decided by a vote of the inhabitants themselves. For various reasons the decision was deferred till the year 1898, when a convention for the purpose of carrying out the plebiscite was signed at Santiago. Pending the settlement of the boundary questions with Colombia, Ecuador, and Brazil, involving perhaps over 200,000 square miles of undeveloped forest tracts, the present area of the republic within its recognised limits exceeds 496,000 square miles, with a coast-line of about 1200 miles running from the Arica bend in a north-westerly direction to the Guayaquil estuary. Landwards its territory is conterminous on the north with Ecuador and Colombia, on the north-east with Brazil, on the east and south with Bolivia and Chile, the Bolivian frontier being much more extensive than any of the others. Owing to the excessive infant mortality, and the great ravages of small-pox amongst the aborigines, the population appears to have remained almost stationary since the census of 1876, when it was returned at 2,621,000 (besides some 350,000 uncivilised Indians).

In 1896 the twenty departments had areas and populations as under:—

Departments.	Area in sq. miles.	Population.
Piura	16,825	213,909
Cajamarca	12,538	442,412
Amazonas	13,943	70,676
Loreto	288,456	100,596
Liberdad	10,206	250,931
Ancacha	16,562	428,703
Lima	13,310	298,106
Callao (prov.)	14	48,118

Departments.	Area in sq. miles.	Population.
Huancavelica	9,251	223,796
Huanuco	14,024	145,309
Junin	23,347	394,393
Ica	8,718	90,962
Ayacucho	18,185	302,469
Cuzco	156,270	438,646
Puno	41,198	537,345
Arequipa	21,947	229,007
Moquegua (prov.)	5,549	42,694
Apurimac	8,187	177,387
Lambayeque	4,614	124,091
Tacna	12,590	50,449
Total	695,733	4,609,999

Of the present inhabitants of Peru more than half, or about 57 per cent, are believed to be full-blood Indians, for the most part direct descendants of the ancient people, who still speak the Quichua language, and preserve almost unimpaired the consciousness of their former greatness as an imperial race. About 23 per cent are Mestizos—partly Cholos, partly Zambos, and the remaining 20 per cent mostly full-blood Spaniards, with nearly 20,000 Europeans and Americans, and perhaps 25,000 Asiatic coolies, mainly from the southern provinces of China.

Physical Features: Plateaux and Cordilleras

That section of the Cordilleras which lies within the political frontiers of Peru presents some distinctive characters, the most striking of which are its general trend and its horizontal development. About the latitude of Arica towards the Chilean frontier the whole system bends round somewhat abruptly from the normal south-north to a north-westerly direction, which is maintained by the main ranges for a distance of 1200

miles to the Loja knot within the Ecuadorean frontier. At the same time the uplands broaden out in the direction from west to east far beyond the Peruvian frontier, thus embracing a large part of the neighbouring Bolivian republic, and developing a vast tableland, surpassed in extent and altitude only by the great Tibetan plateaux. This tableland, which stands at a mean elevation of from 11,000 to 12,000 feet, is enclosed east and west by the two main branches of the Andean system.

In Peru these ramparts are respectively known as the *Andes* and the *Western Cordillera*, the former term being used in a pre-eminent and exclusive sense, while *Cordillera* is also applied to the secondary ridges running either parallel or transversely to the main ranges. In general their elevation is less than that of the Chilean and Ecuadorean sections, and in the south the western branch, although presenting towards the sea the appearance of an unbroken rocky barrier of great height, rises in reality but little above the level of the plateau, of which in fact it forms the seaward escarpment.

The Negra and Blanca Ranges

But farther north are developed the two lofty and parallel crests of the *Cordillera Negra* and the *Cordillera Nevada*, where the Peruvian system attains its greatest elevation. Here the Cordillera Negra, that is, the outer range between the sea and the Rio Huaraz, or upper valley of the Rio Santa coast-stream, rises above 16,000 feet, while its lowest passes stand at an altitude of 13,800 feet. But no snow lodges on its upper crests, which, in contrast to the inner range, remain bare and bleak, whence its epithet of "Negra."

Still loftier is the parallel inner range of the Cordillera Nevada or Blanca, *i.e.* "white," which runs at an altitude of over 18,000 feet between the Rio Huaraz and the upper Marañon valley, and thus forms the true water-parting between the Pacific and the Atlantic slopes. Here stand all the highest summits of the Peruvian highlands—the *Cerro de Huandoy*, the *Cerro de Hualcan*, and the twin-peaked *Huascan*, all over 20,000 feet, while Huascan (Huascaran) probably exceeds 22,000 feet. It was for the first time ascended by Mr. C. R. Enock to a height of 16,500 feet in 1904.

The Cerro de Pasco and Carabaya Range

Towards the sources of the Marañon all the main ranges, with their connecting cross-ridges, converge in the knot of the *Cerro de Pasco*, which takes its name from the neighbouring upland town of Pasco. In this rugged alpine region, where the plateau formation almost disappears amid a chaos of irregular crests and chains, the *Huaylillas* peak rises considerably above 16,000 feet. Here the *Carabaya* section of the eastern rampart facing the Amazonian slopes has several snowy summits falling little below 16,000 feet, while *Chololo* within the Bolivian frontier has an estimated altitude of over 17,600 feet. This snowy Carabaya range, where the Inambari and other headwaters of the Madre-de-Dios have their source, throws out its eastern spurs as far as 67° W. long., which gives an extreme breadth of about 850 miles for the Peruvian uplands at their widest part between Cuzco and 10° S. lat.

Farther north the plateau formation continually decreases in breadth in the direction of Ecuador, while the Cordilleras in the northern provinces fall proportion-

ally in height and acquire a more irregular character. Here the system breaks into a number of separate ridges with peaks often not more than 10,000 feet high, but still generally disposed in the same north-westerly direction as the main ranges.

The Volcanic Zone: Misti—Omate—Tutupaca

Passing southwards from Ecuador, the traveller is at once struck by a marked change in the aspect of the scenery, due to a total absence of volcanoes. No burning mountains occur anywhere except in the southern section of the Western Cordillera, where they are mainly confined to the districts of Arequipa and Moquegua. Here are disposed roughly, in a line with the main crest, a considerable number of extinct and quiescent cones, some of which may approach and even exceed 20,000 feet in altitude. But, pending accurate measurements, the estimates of observers vary greatly, as in the case of *Misti*, most conspicuous and best known member of the group, for which the estimates range from 17,900 to 20,260 feet. North of this central cone, which overshadows Arequipa, the loftiest summits appear to be *Chachani* (19,820 ?), *Achatayhua* (18,700 ?), *Sara-Sara* (20,000 ?), *Coro-Puna*, while to the east rises *Ubinas*, to the south the restless *Omate* (*Huayna-Patina*), and near the Chilean frontier *Tutupaca* or *Candarave* (18,960 ?).

Both Omate and Tutupaca have been the scene of terrific explosions, the latter in 1779, the former in 1600, when Arequipa, over 42 miles away, was nearly destroyed by an earthquake, and then wrapped in a shroud of black smoke for ten days. Prodigious quantities of scoriæ and ashes were ejected, the volcanic dust

was wafted 930 miles seawards, and the roar of the groaning mountain was distinctly heard in Lima, 530 miles away to the north. Here is one of the highest observatories in the world, a branch of the Harvard Observatory, standing within view of Chachani to the north, Misti to the north-east, and Pichu-Pichu (17,500 feet) to the east. But the meteorological station founded in 1893 on Misti, by Mr. S. D. Bailey, was abandoned in 1901.

Underground Agencies—Thermal Waters

Underground disturbances are, if less frequent, certainly more violent in Peru than in Japan itself. Nor are they restricted to any particular area, and are felt quite as much in the igneous districts, despite their volcanic "safety-valves," as in other parts of the seaboard and of the plateau. At Lima, away to the north, the seismograph records on an average as many as eight yearly shocks, one of which levelled its port of Callao in 1746. Arica and Arequipa were nearly destroyed in 1868, and the whole of this seaboard was again ravaged in 1877.

The presence of dormant subterranean forces is attested by numerous thermal springs occurring in every part of the country, and generally abounding in mineral substances. Such are the so-called *Baño del Inca*, the "Inca's Baths"; the *Agua Caliente*, "Hot Waters"; *Brioso*, *Chincay*, *Chancos*, *Pararcar*, *Patina*, and many others.

Varied Scenery—Local Terminology

Few regions of the globe present a greater diversity of sublime or picturesque scenery than the Peruvian section of the Andean uplands, with their western and

eastern fringes of dry, arid seaboard, and moist Amazonian woodlands. Here some confusion is caused by the peculiar use of certain terms, by which the different superimposed zones are locally distinguished. Thus the *montaña* comprises, not the Alpine heights, but the lowest zone of wooded Amazonian slopes up to about 5000 feet. So also *sierra* is applied, not so much to any particular jagged crest, as in other parts of the Spanish-speaking world, as to the temperate zone, generally between 5000 and 11,000 feet. Higher up follows the *puna*, corresponding to the Venezuelan and Colombian *paramo*—a narrow zone of cold, bleak terraces and passes from 11,000 to 14,000 or 15,000 feet, above which are the snowy crests and slopes of the Alpine region, designated as the *cordillera*, also in a special sense.

This singular diversity in the character of the landscape is referred to in vivid language by Mr. E. G. Squier, who remarks that nowhere else does nature assume grander, more imposing or varied aspects than in Peru. "Deserts as bare and repulsive as those of the Sahara alternate with valleys as luxuriant as those of Italy. Lofty mountains, crowned with eternal snow, lift high their rugged sides over broad bleak *punas* or table-lands, themselves more elevated than the summits of the Alleghanis. Rivers taking their rise among melting snow precipitate themselves through deep and rocky gorges into the Pacific, or meander, with gentle current, amongst the majestic Andes to swell the flood of the Amazon. There are lakes ranking in size with those that feed the St. Lawrence, whose surfaces lie almost level with the summit of Mont Blanc." [1]

No greater contrast can well be conceived than the two neighbouring regions of the Amazonian slope and

[1] *Peru: Incidents of Travel*, etc., 1877.

the Andean uplands—a contrast apparent as much in the conformation of the land as in its climate and natural products. The montaña, as above defined, presents itself as a boundless, relatively low-lying, hot alluvial region, traversed in every direction by great rivers teeming with multitudes of fishes in endless variety of size and form. It is a land covered with virgin forest, laden with luxuriant foliage and brilliant blossom, rich in medicinal and other useful plants, birds and wild animals, but thinly peopled with a few hordes of savage Indians, struggling for existence against a too exuberant nature. Here are seen the luxuriant growths of the tropical world—tree-ferns, the graceful bamboo and lovely palms, such as the *Pashinba*, shooting straight up from its curious stilt-like aerial roots. Here prowls the hungry jaguar, and all the land teems with humming-birds, bright butterflies, and deadly snakes. Here also thrive the sugar-cane, the coffee, cacao and coca plants, the manioc root, and the valuable species of the yellow chinchona bark known as *C. calisaya*, which was obtained from this region by Sir Clements Markham in 1860.

The mountainous parts of Peru, on the contrary, though of less extent, present far more varied features, and everywhere reveal the traces of a thousand historical memories. Its Pacific seaboard, where in some places are stored up for future use inexhaustible supplies of petroleum, forms a long arid waste, at certain intervals intersected by narrow green river-valleys. These winding strips of verdure are fertilised in the rainless zone by the short coast-streams resulting from the melting of the snows on the gigantic Cordilleras, which at some points tower to a majestic height within a few miles of the rock-bound shores of the ocean.

Farther inland the elevated plateau, ranging from 11,000 to 14,000 feet above the sea, is flanked on one side by the unbroken line of the Western Cordillera, and on the other by the less connected eastern chain of the Andes. Here are situated the cold, barren, cheerless *despoblados* and the scarcely less extensive *punas*, whose scanty herbaceous vegetation yields but a meagre fare to the llama and alpaca. Here are also situated those hill-encircled *bolsones*, or closed valleys, with the climate and products of the temperate zones, where formerly flourished the mysterious civilisation of the Incas. Here are seen those deep, narrow, mountain gorges, where the thousand head-streams of the Amazon collect their waters before forcing their way over roaring cataracts and through the dark clefts of the Andes down to the plains of Brazil.

Hydrography—The Amazon System

Partly on geographical, partly on political grounds, the mighty Amazonian fluvial system is usually and conveniently divided into three great sections—the *Marañon* or upper course, from its farthest sources in the Peruvian highlands, to Tabatinga on the Brazilian frontier; the *Solimões* or middle course, from this point to the Rio Negro confluence; and the *Amazon* proper, or lower course, from the Rio Negro to the Atlantic.

The two latter sections of the main stream, together with most of their ramifying branches, are comprised within the confines of Brazil, while the upper section, together with the upper valleys of some of the Solimões affluents, belong entirely to Peru. Here rise and flow for hundreds of miles the Marañon, the *Huallaga*, and

the *Ucayali*, that is, the three farthest head-streams of the whole system, which with the Paute, Pastasa, Tigre, and Napo from Ecuador converge above Tabatinga to form the Solimões. The three Peruvian valleys are all disposed mainly parallel to each other in the direction from south to north, the Ucayali in the east, that is, along the inland slope of the Andes chain; the Huallaga in the middle, that is, mainly through the heart of the plateau; and the Marañon in the west, that is, nearest to the Pacific along the inner foot of the Western Cordillera.

It is apparently owing to this westernmost position, farthest from the Atlantic, that the Marañon is commonly regarded as the true upper course of the Amazon. But were the question to be decided by length and volume, this honour should certainly be transferred to the Ucayali, which at the confluence is the larger of the two, and has also a much longer course, as was already suspected by La Condamine in the eighteenth century. The same view has since been taken by Squier and others.

In any case the Ucayali was already known from Arana's expedition of 1866 to be navigable by steamers for hundreds of miles above the Marañon confluence. For 600 miles to the mouth of the *Pachitea*, a tributary from the west, it was found to have an average depth of from 40 to 70 feet, with a gentle current of only two to three miles an hour. The Pachitea itself was ascended for a further distance of 204 miles to the junction of the *Palcazu*, on the banks of which is situated the village of Mayro, the nearest point to Lima, at which this vast fluvial system begins to be navigable. The two smaller steamers of the expedition had no difficulty in reaching the port of Mayro, thus proving that by

this route the Amazon and its tributaries are navigable for 3623 miles to within 325 miles of the Peruvian capital.

It should be mentioned that a treaty was concluded in 1851 with Brazil, securing the free navigation of the Amazon by Peruvian vessels between the Atlantic and these interior districts. Since 1862 the great waterways within Peruvian territory have, thanks to this arrangement, been regularly traversed by steamers in conjunction with the lines of Brazilian vessels plying between the Atlantic port of Para and Tabatinga on the Peruvian frontier.

The Marañon and Putumayo

The Marañon, which issues from the little *Lake Lauricocha*, north of the Cerro de Pasco, at an altitude of 14,270 feet above sea-level, flows for a long distance in the normal north-westerly direction in a deep and somewhat narrow bed, forcing its way through the Andes proper in a series of wild rocky gorges and rapids, here called *pongos*. At the *Pongo de Manseriche*, last and most famous of these narrows, it has already reached the low level of about 550 feet above the sea, so that from this point to the estuary the fall is scarcely perceptible. In the latitude of about 5° S. it curves round from the north-west to the east, and retains this direction for the rest of its course to the Atlantic.

In the debatable region between Peru and Ecuador the Marañon is joined on its right bank by the Huallaga and the Ucayali, and at S. Antonio on the left below Tabatinga by the *Putumayo*, which, although mainly a Colombian river, enters Brazil in its lower course, and higher up flows for some distance through territory con-

tested by Colombia and Peru. After its junction with the S. Miguel and other head-streams about the frontiers of Colombia and Ecuador, and not far from the Cerro de Loja, the Putumayo takes a south-easterly course through the wooded Amazonian plains, where it is navigable by small steamers for about 900 miles from Montepa to the Solimõens. But the navigation is almost everywhere much obstructed by tortuous windings, shoals, and shifting sandbanks.

The Ucayali System

Unlike the Putumayo and the Marañon, the Ucayali is formed by the junction, not of two or more separate head-streams, but of two great fluvial systems, whose intricacies, increased by an uncertain nomenclature, have not yet been entirely unravelled. One of its chief sources lies far to the south in the lakelet *de la Raja*, on the northern slope of the Cerro de Vilcañota, which forms the divide between the Amazon and the closed basin of Lake Titicaca.

Here rises the *Vilcamayo*, which lower down becomes the already mentioned Urubamba, and is joined on its right bank by the *Paucartambo*. At this confluence the main stream thus formed is variously known as the *Quillabamba*, *Urubamba*, and *Vilcamayo*, some confusion being caused by this twofold use of the two last mentioned terms, which, with the alternative Quillabamba, are indifferently applied to the section of the south-eastern system between the mouth of the Paucartambo and the confluence of the south-western branch, as the second great system may be called.

This is both the more intricate and apparently the longer of the two, its most southern source being, according to some authorities, in the *Cordillera de Chila*, within 100 miles of the Pacific Ocean, while its westernmost

supplies come from the *Junin* basin beyond *Lake Chinchaycocha*, south of the Cerro de Pasco. From the south comes the *Catonga* or *Apurimac*, already swollen in its upper reaches by numerous tributaries, such as the *Tambobamba*, the *Pachachaca*, *Pampas*, and *Pulperia*, all flowing, like the Marañon, in deep, narrow, rocky beds. The Pachachaca is spanned by a fine stone bridge dating from Spanish times, while the Pampas and Apurimac are crossed by the so-called *mimbres*,—aerial suspension-bridges waving to and fro with every breath of wind.

From Lake Chinchaycocha issues the *Rio Jauja* or *Mantaro*, which winds in a singularly tortuous channel, here and there doubling upon itself in its struggles to escape from the entanglements of the sierras to its junction with the Apurimac. Between the lake and this point there is a total fall over endless gorges and rapids of no less than 12,000 feet (13,420 to 1420). At the confluence the united stream takes the name of *Ene*, which after its union with the *Perene* becomes the *Tambo* as far as its confluence with the south-eastern system, where the united waters, here not more than 860 feet above sea-level, form the Ucayali properly so called.

In its course of several hundred miles through the montaña to the Marañon below the mouth of the Huallaga, the Ucayali has a total incline of not more than 540 feet (860 to 320). Hence in its lower course it flows with an extremely sluggish current between low winding banks, developing, like the Amazon itself, innumerable side-channels, backwaters, and spacious lagoons, alternately flooded or left dry with the periodical inundations and subsidences. In its lower reaches the Ucayali is joined by only one important affluent, the already described Pachitea.

The Huallaga and Javari

Although several hundred miles long, the *Huallaga* is almost an insignificant stream compared with the Marañon and the Ucayali, between which it flows in a nearly parallel course to its junction with the former below the mouth of the Pastasa. It is also of far less economic importance, being so obstructed by pongos that, according to Raimondi, it cannot be safely navigated by steamers beyond Laguna, about 28 miles above its mouth. Light craft ascend at high water as far as Tingo Maria, 330 miles higher up.

Still less important is the *Javari*, which joins the Amazon below Tabatinga, and for most of its course forms the political boundary towards Brazil.

Pacific Drainage

There is no room for the development of large rivers on the relatively narrow strip of seaboard, which is, moreover, comprised for the most part within the rainless zone. During the greater part of the year the fluvial beds are mere *quebradas*, that is, waterless ravines, like the wadys of Arabia, with a little moisture below the surface and subject to periodical freshets. Of these intermittent coast-streams the most copious appears to be the *Huaraz*, which traverses the long, narrow, and fertile valley known as the *Callejon de Huaraz* between the Cordilleras Negra and Nevada. Issuing from the little *Lake Conococha* (12,940 feet), the Huaraz rushes down a precipitous incline to its junction with the *Chuquicara* coming from the opposite direction. Below the confluence the united stream turns abruptly to the left, forcing a passage through the Cordillera Negra to the

coast zone, where it takes the name of *Santa*, from the town near which it enters the Pacific after a rapid course of about 240 miles. South of the Santa follow the *Rimac*, which gives its name to *Lima*,[1] capital of Peru, the *Chunchanga*, *Ica*, *Grande*, *Yauca*, *Ocoña*, *Tambo*, *Ylo*, and others, not one of which is perennial or navigable at any time.

Lacustrine Basins—Lake Titicaca

The term *cocha*, that is, "lake," which forms an element in so many geographical names, attests the presence on the plateau and its slopes of numerous lacustrine basins, such as *Chinchaycocha* in the Junin district, one of the sources of the Ucayali; *Parinacocha*, *Chinacocha*, *Caballococha*, *Huachacocha*, *Huascacocha*, *Orcococha*, and others, mostly mere upland tarns of small size. But on the south-east frontier stretches the vast closed basin of *Titicaca*, which, however, belongs almost more to Bolivia than to Peru.

Titicaca, which is incomparably the largest body of fresh water in the southern continent, being surpassed in the New World only by the great lakes of North America, forms an irregular oval, disposed in the same direction from south-east to north-west as all the great Peruvian ranges, and divided into two very unequal secondary basins by the two peninsulas of *Copacabana* and *Tiguina*. It has an extreme length of 130 miles, with a mean breadth of 44 miles, and a total area of 3300 square miles. Its present altitude, which slightly varies with the seasons, ranges from about 12,200 to

[1] By normal interchange of *r* and *l* *Rimac* became *Limac*, and by loss of *c* *Lima*. The word in Quichua means the "Speaker," in reference to a temple which formerly stood on its banks and was famous for its oracular utterances.

12,220 feet. But it formerly stood much higher, and is said to have then drained to the Amazon. But of this there is no evidence, and at present it discharges through the *Desaguadero* emissary, 160 miles long, to the swampy and saline Lake *Aullagas* (Poopo), which appears to be itself a closed basin. At least there is but one perceptible outlet, and that too small to carry off all the superfluous water, so that the excess must either be discharged by some underground channel or else lost by evaporation. Owing to its great altitude Titicaca, which has a depth in places of over 890 feet, presents a somewhat dreary aspect, its treeless shores fringed with a scant and stunted vegetation, and its shelving margin overgrown with tall rushes. Formerly its icy waters were enlivened only by *balsas* with reed sails, but since the opening of the railway through Arequipa to the Pacific coast, Puno maintains a number of steamers on the lake, besides a flotilla of *balsas*, which are made of reeds firmly lashed together, and propelled by reed sails.

Climate

In Peru the three natural regions of the montaña, the plateau, and the seaboard have each its special climate, while the higher crests penetrate into the frigid zone. The trade-winds, which in all the equatorial regions of the New World set steadily from east to west, sweep up the great valley of the Amazon, checked by no obstacle until they strike against the eastern slopes of the Andes. Here the moisture-bearing clouds discharge most of their contents in the form both of rain and snow, and in their further progress across the plateau to the Western Cordilleras the warm humid Atlantic currents assume more and more the character of cold dry winds,

which blow away over the Pacific without contributing a drop of rain to the western slopes and coast-lands. But although a regular shower is here the rarest of phenomena, a little moisture in the form of dense fog or vapour helps to nourish the scanty vegetation during the winter season from May to December. The *garuas*, as these vapours are called, seldom rise higher than about 1300 feet on the Pacific slopes, where the transition in some places is quite abrupt from the lower foggy to the higher rainy zone. On these coast-lands the temperature is moderated both by the marine breezes and by Humboldt's cold marine current, which here sets steadily from south to north, and is many degrees cooler than the surrounding waters. Thanks to these combined influences, the normal temperature of Lima near 12° S. lat. is only about 68° Fahr. At Nauta it rises to 77°, and falls with the increasing altitude to 60° at Cuzco and 40° at Cerro de Pasco.

Despite the relatively moderate mean temperature all the low-lying coast-lands are exposed to the ravages of yellow fever. Here also the creoles, or whites of pure Spanish stock, appear to be scarcely yet acclimatised. There is little if any natural increase, owing to the excessive mortality of the children, who are subject to convulsions and to the so-called "seven-days' sickness," which attacks new-born infants and is always fatal. Ague, dysentry, and liver affections also prevail in the seaboard, and typhus and typhoid fever in the montaña, while the uplands suffer especially from the somewhat mysterious *soroche*. This strange disorder, which is due to the rarefaction of the atmosphere at great elevations, assumes different forms in different places, but is never fatal.

Flora

Thanks to the immense diversity of its soil and climate, combined with the varying aspects and altitudes of the land, the floras of all the zones, from the frigid to the torrid, are represented in Peru. Here the exuberant tropical forests of the hot and abundantly watered montaña are succeeded in the more elevated valleys by the useful plants of the temperate and sub-tropical regions, and above these follow the herbaceous and scrubby growths of the elevated steppe and alpine slopes. In some districts we pass from sugar, cacao, or coffee plantations through banana groves to waving fields of maize, wheat, or barley, to orchards with all the fruits of the temperate zone, and to open, grassy plains roamed by horned cattle and flocks of the native alpaca and llama. Above the range of the cacao (2000 feet) the coffee shrub (4000), the sugar-cane and nopal (4300), the potato, European beans and cereals yield excellent crops, while the vine, introduced at an early date, thrives well in the volcanic Moquegua district on the south-west coast.

A highly characteristic member of the Peruvian vegetable kingdom is the so-called *tamai caspi* or "rain-tree," which in the Moyobamba district grows to a height of about 60 feet. It takes its name from the remarkable property which it possesses of absorbing the humidity of the atmosphere in such abundance that the foliage keeps continually dripping even in the driest weather. This property is not quite analogous to that of the "pitcher-plant" of Madagascar, which does not appear to distil the moisture, but merely to collect the rain as it falls in the large cavities at the junction of the branches with the stem.

Fauna

Of the large mammals the most characteristic, as well as the most useful, is the "American camel," of which there are four distinct varieties—the *llama*, *vicuña*, *alpaca*, and *guanaco* (huanaco). The llama, which thrives on the coarse herbage of the puna region, where other herbivorous animals would perish of hunger, had already been domesticated at a remote period as a beast of burden by the Quichuas. Hence it is no longer found in the wild state. When properly trained and well fed, the llama carries a load of 60 to 70, or even 75 pounds, and of its wool is woven a stout, serviceable cloth, while in some districts its droppings (*taquia*) are the only available fuel. The llama is not descended from the guanaco, as was formerly supposed, but is certainly a distinct and smaller species. Since the introduction of the European horse, ass, and mule, the llama is less used as a beast of burden, especially in the mines, and is now bred chiefly for its wool, which varies greatly in quality. In this respect the fleece of the alpaca is much finer and of more uniform texture, hence is largely imported into Britain; even the animal itself has been recently introduced both into England and Ireland.

Although now confined to the Andean uplands, all these members of the camel family ranged formerly not only into Brazil and the Argentine pampas, but also into North America, and the fossil remains of closely-allied forms are found in the Tertiary deposits of all these regions.

A curiosity of the snake world is the *calambo*, a species of boa constrictor, which the natives have succeeded in domesticating. These large reptiles are trained like watch-dogs to protect gardens and other enclosures from

depredators, and they become so attached to the place where they have been brought up that it is found impossible to remove them elsewhere. Many parts of the neighbouring ocean teem with marine life and aquatic birds almost to an incredible extent.

Inhabitants—The Cultured Peoples—The Yuncas

There is good reason to believe that in pre-Columbian times Peru was much more thickly peopled than at present. The early writers assign a population of from ten to twelve millions to the empire of the Incas, and even after the massacres of Almagro, Pizarro, and their followers, the same region is stated to have still had as many as eight million inhabitants in 1580, or about two millions more than at present.

From remote times the great bulk of these populations had been constituted in settled communities, with political and social institutions sufficiently advanced to justify their claim to be regarded as civilised peoples.

Amongst these peoples, who belonged to at least two distinct races—the *Quichua-Aymara* of the plateau, and the *Yunca* of the Pacific seaboard—three distinct civilisations had been developed in three cultural centres: *Chimu* of the Yuncas, in the present district of Trujillo on the coast; *Tiahuanaco* of the so-called Aymaras, about the southern shores of Lake Titicaca; and *Cuzco* of the Quichuas, in the present department of that name. But some time before the advent of the whites the first two had been absorbed in the third, so that the Conquistadores found the whole region from the equator to Chile, and from the Amazonian slopes to the Pacific, constituted in a single political state—the empire of the Incas, that is, of the dominant branch of

the Quichua nation. In later times the term "Inca" acquired a somewhat restricted meaning, as the name of a royal family or dynasty. But it is now generally admitted that the Incas were originally a tribe of Quichuan stock, who rose to power in the Cuzco district under their chief Manco-Capac, "first of the Incas," early in the eleventh century. It should also be explained that the other terms—Yunca, Aymara, and Quichua itself—are all misnomers, although now too firmly established to be set aside. In the Quichua language "Yunca" simply means hot lowlands, while "Chimu," also applied to the race, was merely the name of their chief city near Trujillo, so that the true name of this mysterious people is lost. They have themselves been long assimilated to their Quichua conquerors, who even planted colonies in their territory, as was their wont. But their language, which was called *Mochica*, and was radically distinct from Quichua, has fortunately been preserved in a grammar published in 1644 by F. de la Carrera, a native of the country.

It is from this source, as well as from the character of their monuments, that the Yuncas are known to have been a distinct people, and their culture independently developed in pre-Inca times. Their empire extended for over 600 miles along the coast, and a vast space was occupied by their capital, Chimu, which was captured and destroyed by the Inca, Yupanqui. The ruins of this great city extend from the Monte Capana southwards to the Rio Moche, covering an area of nearly fifteen miles in this direction, and from five to six east and west. "In every direction, for an extent of several leagues, long lines of massive walls, *huacas*, palaces, aqueducts, reservoirs of water and granaries can be made out. Everything proves the power and wealth of a people, the

very name of whom has remained uncertain."[1] Of these ruins the largest, as well as the most characteristic, are the truncated pyramids here called *huacas*, or burying-places, one of which stands on a base 580 feet square, and is still 150 feet high. Larger still is the "Temple of the Sun," at the village of Moche, which is a rectangular structure 800 by 470 feet, 200 feet high, and covering an area of over 7 acres. Monuments of this type occur nowhere else in South America, and from their resemblance to the Mexican teocalli some archæologists have inferred that the Yunca culture was of Toltec origin. But the Toltecs are now believed to have been a Maya people, and the Yunca language bears no kind of resemblance to Maya, or to any other North American tongue.

The Aymaras

Before their conquest by Mayta-Capac, the people now called "Aymaras" appear to have had no collective name, but were known as *Collas*, from the tribe on the north side of Titicaca, which was the first met by the Incas when they penetrated into this lacustrine basin. After the conquest the whole region was partly resettled in the usual way by families drawn from nearly all the royal tribes of Peru. One of these were the *Aymaras*, who founded new homes in the territory of the Lupacas, a Colla people dwelling on the west side of the lake, where after the Spanish conquest the Jesuits established a mission in 1570. These Quichuan settlers were thus mistaken for a Colla tribe, and the term "Aymara" transferred from an obscure Inca clan to the whole of the Colla nation. The error was perpetuated when the same name was given to the local dialect in

[1] M. de Nadaillac, *Pre-Historic America*, p. 395.

which a grammer was afterwards published (Rome, 1603), but which was not "Aymara" (Quichua) but the Lupaca (Colla) language, remotely akin to Quichua.

Reference has already been made (Chap. III.) to the ethnical and cultural relations of the Aymaras to their Quichuan conquerors and "younger brothers." Their

THE GREAT DOORWAY, TIAHUANACO.

civilisation, as represented by the wonderful monuments of Titicaca, on the whole the most stupendous ruins in the New World, is supposed to have been independently developed on the spot, and in any case had its beginnings, like that of the Yuncas, in pre-Inca times. Its distinctive character is shown not only by the still standing megaliths, unlike anything else in America, but also by the huge monolithic doorways, unlike anything else in the whole world, as well as by many of the

details—symbolical carvings, bas-reliefs, colossal statues exquisitely polished blocks, and numerous other features, as described and illustrated in Stübel and Uhle's sumptuous work. The astonishment inspired by these remains, which are scattered over a wide area, is greatly increased when it is considered that they were erected on what is now a bleak treeless plateau, 12,000 feet above sea-level, and that the blocks, some weighing from 100 to 150 tons, had to be transported many miles either up steep inclines or else across numerous inlets along the shores of the lake. It would appear from the many highly polished slabs lying flat on the ground, as if ready for the mason, that all formed part of a general design rivalling in magnitude those of the largest Egyptian temples, but never completed. The great doorway, hewn in a single piece, weighing over 12 tons, and decorated with the image of Viracocha, tutelar deity of the Aymaras, is the supreme triumph of the native American architecture. "Its significance exceeds everything hitherto discovered in Peru, and it ranks amongst the most remarkable remains of pre-Columbian America."[1]

Other structures, which are also of very great interest, being intimately associated with the most hallowed memories and traditions of the Quichua-Aymara peoples, are found in the islands of the neighbouring lake. Specially remarkable is that of *Titicaca*, which gives its name to the whole basin.

The Quichuas—Empire of the Incas

After the subjugation of the Aymaras all their sacred legends and traditions—older and more venerated

[1] *Stübel und Uhle*, Text, p. 20.

than those of the Quichuas themselves—would appear to have been appropriated or adopted by the Incas. Thus may be explained the curious fact that Titicaca, which lay in Aymaraland and was unknown to the early Incas, became nevertheless associated with the myth of their divine origin. Here, according to some versions, the sun reappeared after a total eclipse of several days; here were born Manco-Capac and Oello, children of the Sun, and from Titicaca they issued forth to found their empire, not on the shores of the lake, but away to the north in the heart of Peru.

Certain it is that the earlier and more genuine tradition points, not to the Cave of Titicaca, but to that of *Paucaritambo*, about the centre of the national domain, as the true cradle of the Inca race. Attempts were afterwards made to reconcile those contradictions, and one explanation was that, after issuing from Titicaca, the first Inca and his wife descended into the earth and reappeared through the cave at Paccaritambo. The dynasty comprised altogether fourteen Incas (four more or less mythical and ten historical), whose names and dates, as recorded by Garcilasso de la Vega, himself of Inca descent, are as under :—

	A.D.		A.D.
Manco-Capac . . .	1021	Vira-Cocha	1289
Sinchi-Rocca . . .	1062	Pacacutec	1340
Lloque-Yupanqui . .	1091	Yupanqui	1400
Mayta-Capac . . .	1126	Tupac-Yupanqui . . .	1439
Capac-Yupanqui . . .	1156	Huayna-Capac . . .	1475
Rocca	1197	Huascar	1520?
Yahuar-Huaccac . . .	1249	Atahualpa	1532

Under Huayna-Capac, greatest of the Incas, and the last who ruled over an undivided empire, the whole territory comprised four great divisions, which corresponded with the four points of the compass, and were

connected with the capital, Cuzco, by four main highways radiating north to Quitu, south to *Collasuyu* (Aymaraland), east to *Antisuyu*, and west to the Yunca country (Pacific Coast-lands). In the central and more important district dwelt the dominant race, of whom there were six distinct branches: (1) *The Incas*, between the Rios Apurimac and Paucartampu, with the intervening valley of the Vilcamayo; (2) *The Canas*, between the Vilcañota Pass and the Incas in the same valley; (3) *The Quichuas*, whose name was later extended to the whole nation, but whose proper territory lay between the Rios Apurimac and Pampas; (4) *The Chancas*, between Huanta and the Rio Pampas; (5) *The Huancas*, in the Jauja valley and thence to the Cerro de Pasco; (6) *The Rucanas*, on both slopes of the Western Cordillera. Whether the large nation of the *Chinchas*, whose territory (Chinchasuyu) lay north of Cuzco, belonged originally to the same connection, seems doubtful. But in any case they shared the destinies of all the Quichua groups, who after long struggles for the supremacy were reduced and merged in a single political system by the royal Inca tribe.

Reference is often made to a particular Inca language, and a few specimens are given. But these all belong to the Quichuan tongue (properly *Runa Simi*), which obtained a wide range under the Incas, is still the chief medium of intercourse throughout the Ecuadorean and Peruvian uplands, and has also spread to many of the semi-civilised tribes along the banks of the Amazonian affluents. It is a highly polysynthetic form of speech, extremely flexible, rich, and sonorous, at least in the northern districts, where the gutturals are softened and harsh combinations avoided.

Although there is no native graphic system, the

Quichuans possessed a somewhat copious oral literature,

INCA INDIAN.

much of which has been perpetuated since written form was given to the language by the publication of Holguin's

Grammar in 1607. Besides the well-known drama of *Ollantay*, the collections comprise numerous popular songs or ballads, love ditties, elegies, and the like, all in a tender, melancholy strain.

The Uncultured Peoples—The Antis

The other aborigines, most of whom were never brought under Quichuan influences, and still dwell along the river banks or in the wilds of the Montaña, are officially grouped in two social classes—the *Indios mansos* or *Cristianos*, who are generally baptized, somewhat settled, speak or understand Quichuan, and live on friendly terms with the civilised communities, and the *Indios bravos*, the wild tribes, still mostly independent, and in the same state of nature as their forefathers in pre-Columbian and pre-Inca times.

In the Upper Ucayali basin the most numerous and powerful of these savage nations are still the *Antis*, who gave their name to the eastern province of Antisuyu, and are referred to in the above-mentioned Quichua drama of Ollantay. The *Campas*, as they are also called, have always been dreaded for their ferocious character, and are even said to have been cannibals. They wear a long robe with holes for the head and arms, allow their long, lank hair to hang down over their shoulders, and are specially distinguished by the beak of a toucan on a bunch of feathers worn as an ornament round the neck.

The Chunchos

Closely allied to the Antis are their neighbours, the equally wild *Chunchos*, who roam the forests east of Cuzco and Tarma. Here they form three somewhat

distinct groups—the *Huachipayris*, *Tuyuncris*, and *Sirineyris*—who were said to have sprung from the royal Inca tribe, and in any case were for a time brought under Quichuan rule by the Inca Yupanqui. Other groups, belonging to the same widespread family, range into the province of Caravaya, and some have been met

A CHUNCHO FROM THE MONTAÑA.

in the forests of Paucartampu, where they live in well-constructed huts with walls 6 feet high, and good pointed straw roofs, generally perched on rising grounds. Socially the various Chuncho tribes present considerable differences, some being pure savages, who roam the forests in quest of game, have no religion whatever, bury the dead in the huts, and are generally fierce, cruel, and

untamable, while others are advanced enough to cultivate maize, yams, plantains, and pine-apples, and erect fixed abodes large enough to accommodate twenty persons.

Topography—Railway Enterprise

When it is considered that centuries before the discovery Peru was constituted in an organised state of vast size, that in colonial times it formed the chief Spanish Viceroyalty in the southern continent, and that since then immense sums of money have been lavished in developing its natural resources, surprise may well be expressed at the small number of urban centres that have sprung up in this region. The subjoined table of the chief places on the Pacific and Atlantic slopes shows that in 1903 there were only six towns in the whole country with more than 10,000 inhabitants :—

Pacific Slope		Atlantic Slope	
Lima	130,000	Cuzco	15,000
Callao	31,000	Ayacucho	9,000
Arequipa	40,000	Iquitos	8,000
Chiclayo	11,000	Cajamarca	7,000
Monsefu	11,000	Cerro de Pasco	7,000
Trujillo	8,000	Huanuco	5,000

On the seaboard north of Lima the most important place is *Trujillo,* founded by Pizarro in 1535 at the mouth of the Rio de Moche, amid the ruins of *Grand Chimu,* probably the largest city in pre-Columbian America. Owing partly to the absence of natural havens on this seaboard, exposed to heavy surf, none of the coast towns north of Callao have acquired great commercial importance. *Trujillo* is connected with the port of *Salaverri,* formerly *Garita de Moche,* by a coast-line running north to *Chicama* and *Ascope* through an

arid district, which has been restored to fertility by repairing the old Chimu canals. Here is still to be seen a vast reservoir built of solid concrete, and capable of holding nearly 1800 million cubit feet.

A few miles farther north stands the port of *Pacasmayo*, for which brighter prospects seem reserved. Here is the seaward terminus of a line which at present runs a short distance inland to *Guadalupe* and *Chepen*, but is eventually to be continued through *Cajamarca* and over the Cordilleras down to the Amazon valley. At a time when money was being lavished on these ambitious railway schemes, this line was spoken of merely as the first section of a trans-continental trunk line between the two oceans. *Chimbote*, on El Ferrol Bay, south of the Rio Santa, is the starting-point of another project known as the Huaraz line, which has already been carried up the Huaylas valley to *Recuay*, centre of a mining district 11,000 feet above sea-level.

This line traverses the department of Ancachs, which takes its name from the little Ancachs rivulet, where the insurgents gained a decisive victory over the Spanish forces. The Ancachs joins the right bank of the Rio Santa just below *Yungay*, at the foot of the Cerro de Huascan. A little lower down is the town of *Caraz*, noted for its quicksilver and coal mines, and for a peculiar variety of the potato, which ripens in three months. Below Caraz follows *Huaylas*, which gives its name to the upper course of the Rio Santa. All these places are stations on the Huaraz railway, which follows all the windings of the fluvial valley to its source at Recuay.

Below Chimbote, the coast town of *Huaura*, at the mouth of the Rio Supe, is the present terminus of a coast-line which runs by *Huaucho*, *Chancay*, and *Ancon* to Lima. During the progress of the works on this line

a cutting in the dunes at Ancon revealed an extensive old burial-place, from which have been recovered great quantities of objects illustrating almost all branches of the Peruvian arts and industries. These objects—pottery, textile fabrics, ornaments, arms, utensils, and implements of all kinds—had been deposited with the dead, and, thanks to the extremely dry climate, were found for the most part in a good state of preservation. The dead themselves were mummified and wrapped in packs enclosing one or more bodies, or even several members of a family, and so arranged as to present the rough appearance of a single human being with a false head, but very broad and without any attempt at reproducing the contour-lines of the figure. The outer wraps varied in quality with the social position of the departed, some being extremely rich, others plain and coarse as sackcloth, as it was inside these wraps that were found most of the articles stowed away with the dead to supply them with all their requirements in the after life.[1]

After the overthrow of the Incas, it was at once seen that the seat of the new government would have to be removed from their inland capital, Cuzco, to some point on the seaboard affording easy communication with the metropolis. In the absence of any good havens, the most favourable site seemed to be the open roadstead at the mouth of the little river Rimac, which was sheltered by the island of San Lorenzo and a projecting tongue of land from the west and south-west winds. Here was the seaport of *Callao*, which now became the outlet of the new capital *Lima*, founded in 1535 by Pizarro on the left bank of the river three or four miles from the coast.

[1] W. Reiss and A. Stubel, *Peruvian Antiquities. The Necropolis of Ancon in Peru*, English edition by A. H. Keane, 1881-83.

In anticipation of a greatness destined never to be realised, the "City of Kings," as it was called, was laid out on a large scale. But the "Empire City of the New World" has disappointed the hopes of its inhabitants, and is already outstripped in wealth, trade, and population by Valparaiso, Buenos Ayres, Rio de Janeiro, and a few other places in South America alone.

LIMA.

Lima stands almost at the very foot of the Coast Range, whose advanced spurs rise immediately above the flat roofs of the houses. From these heights a commanding view is afforded of the city, laid out like a chess-board, diversified chiefly by numerous churches, conspicuous amongst which is the fine old Spanish cathedral on the "Plaza Mayor." In this bird's-eye view are also comprised the often really magnificent inner courts of the more aristocratic quarters. But what imparts to Lima quite a characteristic aspect are the countless little

square structures on the flat roofs, provided with trap windows, which serve the double purpose of ventilating and lighting the interior.

Scarcely a drop of rain falls for years together, although now and then the saturated atmosphere precipitates a heavy dew sufficient to moisten the surface of the ground.

In the Plaza Mayor, which, as is usual in South American cities, forms a perfect square, stands the cathedral, flanked with two lofty towers. The centre of the square is laid out as a public garden, ornamented with fountains, statues, and marble seats, and enclosed on three sides by covered colonnades, beneath which wares of all kinds are exposed for sale. Amongst the scientific and literary institutions are the University of San Marcos, the oldest in South America, several libraries and museums, which were despoiled of some of their treasures when the place was occupied by the Chileans during the war of 1879-81.

The monotonous appearance of the straight lines of streets is relieved by the varied forms of the projecting balconies, by the elegant warehouses mostly in the hands of strangers, and the numerous *tiendas* or retail-shops, chiefly owned by Italians, of whom there are many thousands in Lima. There are also a good many Germans and French, the latter mostly hotel-keepers, perfumers, and owners of coffee-houses and fashionable establishments. The English and Americans, on the contrary, are found chiefly in *Callao,* where the shipping interests are centred.

This flourishing seaport, which is now provided with repairing docks and a new harbour 50 acres in extent, does fully one-half of the foreign trade of the country. It is connected with the capital by shaded avenues, and

two railways seven miles long. One of these forms a seaward extension of the famous Oroya line, which is justly regarded as one of the greatest engineering triumphs of modern times. In the short distance of 106 miles it ascends the western slopes from sea-level at Callao to a height of 15,665 feet at the culminating point on the crest of the Cordillera. From this point, the highest yet reached by any railway, the eastern

CALLAO HARBOUR.

section, 30 miles long, falls with a gradient of 120 feet per mile down to a level of 12,178 at its present terminus, *Oroya*, on the Rio Jauja in the Amazon basin. The total length is thus 136 miles; but the line is to be continued eastwards through *Tarma* and *Chanchamayo*, down to some point about the head of the navigation of the Marañon.

The works, everywhere interrupted by the Chilean war, have since been slowly resumed at several points.

An English company has undertaken to complete the Central system, and a branch from Oroya to Cerro de Pasco, the chief silver-mining district (14,000 ft.), was opened in 1904. A short line now also connects the Central system at Ticlio (15,500 ft.) with the Morococho mining district (14,900 ft.), and other lines are in progress or projected to effect junctions northwards with the Pacasmayo-Cajamarca line, and southwards through *Tonquini*, *Ayacucho*, and *Cuzco* with *Sicuani*, present terminus of the *Mollendo-Puno* system. Even before the war the main section of this system had already been completed from *Mollendo* on the coast, north of Arica, to *Puno* on the north-west side of Lake Titicaca, climbing the Cordillera to an extreme altitude of 14,640 feet at *Crucero Alto*. From Puno two branches are to run south to Bolivia and north to the Oroya system. Since the war the northern branch has been carried as far as Sicuani, and is advancing in the direction of Cuzco, while a beginning has been made with the section between Ayacucho and Tonquini.

Even when all these sections are constructed, other branches will be needed to connect the Pacific termini of the three trunk lines—Pacasmayo, Callao, and Mollendo—with the Amazonian affluents, at points where they become navigable below the falls and rapids. One of these necessary connections, already begun, is to run from Oroya through Tarma down the Perene valley to the Ucayali; while another, branching from Ayacucho northwards, down the Mantaro valley to the Apurimac-Tambo confluence, has at least been surveyed. Certainly many more millions will be required to carry out the whole scheme, and until this is done the magnificent works already executed can never pay. At present the transport of goods between the Pacific and Amazonian

basins varies according to circumstances from about £35 to £70, or even £80 per ton, an almost prohibitive charge for a scanty population laden with other heavy burdens.

Of the above-mentioned upland towns, whose prospects are dependent on the development of the Central

BRIDGE ON THE OROYA RAILWAY.

Railway system, the most noteworthy is *Cuzco*, ancient capital of the Incas, and still a place of some importance. It stands at an elevation of 11,400 feet on two torrents flowing to the Upper Huilcamayo, some distance below Sicuani, northernmost station of the Mollendo-Puno railway. The walls of the houses and temples of the ancient city are of such massive masonry that they

remain intact. Upon them have been erected most of the churches, convents, and private mansions of the new town. The names of the four quarters, designated from the four points of the compass, and set apart by the Incas for their subjects from the northern, southern, eastern, and western provinces, are now disused. The great central square has been divided by houses into two smaller squares, which are flanked by some of the finest buildings of the Spanish city.

Conspicuous amongst these are the cathedral and several other churches, whose handsome exteriors are not unworthy of the ancient city. The cathedral replaces the palace of one of the Incas. The church of San Domingo is on the site of the old Temple of the Sun, where stood a solid gold statue of the great orb, tutelar deity of the Incas. On a neighbouring height, laid out in terraces, still stand the massive ruins of the Colcampata palace attributed to Manco-Capac, founder of the dynasty. Above all rises the famous citadel of *Sacsahuaman*, which is said by Garcilasso de la Vega to have been constructed by the Inca, Viracocha, but is in reality much older. After a stubborn resistance it was captured by Fernando Pizarro in 1532. Cuzco may be quickened into new life as soon as the railway is completed, by which direct access will be afforded through Puno and Arequipa to the coast at Mollendo.

Arequipa, the first important station above Mollendo, from which it is distant 100 miles, is noted for its earthquakes. Standing at an elevation of 7600 feet under the shadow of Misti, in a volcanic district subject to constant disturbances, this place has suffered much from earthquakes, by which it was half ruined in 1600, and again in 1868. *Villa Hermosa*, as it was called by its founder, Francisco Pizarro in 1540, has claims to

distinction, and its inhabitants perhaps justly regard themselves as the most enterprising and intelligent citizens of the republic. Besides the Peruvian observatory at Carmen Alto, a meteorological station has been established on the neighbouring Mount Chachani at an altitude of 16,280 feet, which is more than 2000 feet higher than that of Pike's Peak, Colorado, the next highest on the globe.

In the rainless zone between Callao and Mollendo some shelter is afforded by the *Chincha Islands* to the open roadstead of *Pisco*, which has been chosen as the starting-point of another Andean railway. A first section, 45 miles long, has already been constructed across the arid Pampa de Chunchanga district to *Ica*, on the right bank of the river of like name. Here it stops for the present at the foot of the hills, but is eventually to be continued up the slopes to the district about the sources of the rivers Ica and Chunchanga (Pisco), which has long been celebrated for its rich silver ores. At the head of the Chunchanga gorge stands the now almost deserted station of *Castrovireina*, so named in honour of the wife of the Viceroy, Marquis of Canete, at a time when the mining industry was at the height of its prosperity. Of her it is related that a noble and wealthy Indian lady, to whose child the Vice-Queen stood godmother at this place, paved with silver slabs the path which she had to take from her residence to the church in order to attend the christening. But this display of wealth was followed by a dire calamity—the collapse of the richest galleries, crushing over 120 of the underground toilers. Since then most of the mines have been abandoned, and will probably not again be opened until the completion of the projected railway with the coast.

In the district between Mollendo and the old Chilean frontier two other lines were undertaken during the period when railway speculation was at fever heat. The northernmost of these was carried from *Ilo* (Ylo), a few miles inland, to *Moquegua* in the direction of Lake Titicaca, and there it is likely to stop for many years to come. Better prospects may perhaps be in store for the second, which runs from the important frontier town of *Arica* to *Tacna* in the same direction, and also shares in

ARICA.

the busy life of the neighbouring Chilean nitrate industry. Arica, which was wrested by Chile from Peru in 1880, marks the point where the main Andean axis makes a sharp bend to the north-west. It is exposed not only to underground disturbances, but also to concurrent seaquakes, when the sea first retires to a considerable distance from the shore, and then rushes back with a force that nothing can resist. In 1868 a large vessel was torn from its anchorage and borne on the crest of a huge wave more than a mile inland. Then in

1877 the process was reversed, the same vessel being carried half the distance back to its natural element, without any loss of life to a little community of several families who had in the interval established themselves in the hull.

Natural Resources—Vegetable Products

Hitherto the almost inexhaustible natural resources of the alluvial Amazonian woodlands have been scarcely more than tapped. Reference has already been made to the valuable species of chinchona obtained some years ago from this region. The working of the best kind of caoutchouc is now a considerable industry. Foremost amongst the other products of the Montaña is the much-prized coca (*Erythroxylon coca*), the tonic virtues of which have been placed beyond doubt by modern research. As a stimulant it is much used by the natives, who chew the leaves mixed with the ashes of *Chenopodium quinoa*, and are thus enabled to undergo great fatigue on a scanty supply of food.

Guano—Minerals

Formerly Peru possessed great sources of wealth in its guano and nitrate deposits, both of which are of extreme importance as fertilisers. But the guano-beds are already nearly exhausted, while the nitrate fields have passed into the hands of Chile since the war of 1879-81. The richest guano deposits were those of the *Chinchas*, a dreary arid group of rocky islets in the neighbourhood of Pisco. The beds were worked from the surface downwards, the material being removed in layers, and conveyed on trams either to the *molo* or wharf or else to the edge of the cliff and shot over into large barges, and

thence transferred to the vessels engaged in the trade. In 1873 the export from the Chinchas amounted to 100,000 tons, and the deposits on the *Guañape* and *Macabi* islands were also being worked. Operations were later extended to the *Lobos* and *Viejas* groups in Independencia Bay, to the *Lobillo* and *Huanillo* islets in Chiapana Bay, and to others at Punta Alba and Pabellon de Pica. All these smaller beds, which had been seized by the Chileans, have now been delivered over to the Peruvian Corporation, which has been constituted to develop the resources of the country, and whose guano receipts amounted to £177,000 in 1904.

Even the mineral industry, of which Peru was formerly a chief centre, has greatly fallen off, and many of the gold and silver mines have been closed, or yield but poor returns. In 1897 the mining claims of all kinds—the precious metals, copper, lead, zinc, quicksilver, sulphur, salt, coal, and petroleum, besides gypsum, kaolin, ochre, and other valuable earths—numbered 3475; yet the total value of the minerals exported in 1905 scarcely exceeded £1,000,000, while in the same year the total yield of silver was only £648,000. Hence the underground treasures of the country, which undoubtedly still exist in great abundance and variety, have at least at present more of a historical than of a practical interest. Humboldt has estimated the actual quantity of the precious metals extracted from the Peruvian mines under the viceroyalty down to the year 1803 at £246,000,000, and since then the mint of Lima alone issued silver pieces to the value of £3,500,000 between the years 1826 and 1833. This was independent not only of the Cuzco mintage, but also of the silver ingots and ores, large quantities of which were exported during the same period. Cerro de Pasco, centre of a rich argentiferous

district in the department of Junin, has also its smelting works, where the silver ores are dealt with, and stamped bars or ingots issued to the yearly value of about £300,000. But Peru has long ceased to hold the first place as a centre of the mining industry, and in this respect is already surpassed not only by the United States, Australia, and South Africa, but even by the neighbouring republics of Chile and Bolivia.

But, even after most of the mines had for one reason or another been closed, and when the guano-beds began to give out, it was discovered that the State possessed a still scarcely touched source of immense wealth in the nitrate and other mineral deposits of the southern province of Tarapaca. On the maps this district figures as part of the "Desert of Atacama," an expression which also comprises the former Bolivian coast district of Antofagasta, together with Tocopilla, Talcal, and other tracts in North Chile. The whole territory is unquestionably on the surface a desert in the strict sense of the term—a dreary, treeless waste, for long ages forming part of the South American arid zone. But below the surface probably no other region of the same extent possesses a greater abundance of useful mineral products. Besides the nitrates of soda and some other rich fertilisers slowly accumulated beneath those rainless skies, here are concentrated in the relatively narrow space between the seashore and the first Andean foothills great stores of borax, iodine, coal, and rock-salt, besides an extraordinary variety of minerals, such as gold, silver, copper, iron, lead, nickel, and cobalt. In the northern part of the Peruvian coast another source of wealth has been discovered in the almost inexhaustible supplies of petroleum in the desert, 90 miles in extent, between the rivers Chira and Tumbez. This discovery goes far to make up for the loss of Tarapaca.

Causes and Results of the Chilean War

But scarcely had the Peruvian Government laid hands on these reserves of wealth, in order to replenish the national coffers exhausted by reckless extravagance and speculation, when frontier questions and tariff difficulties were renewed or created by the two conterminous States, also eager to secure as large a share as possible of the lately discovered treasures. At that time Bolivia had access to the sea through the district of Antofagasta, wedged in between South Peru and North Chile. But the southern boundary had fluctuated since 1861 between 23° and 24° S. lat., claimed respectively by Chile and Bolivia, and under the new conditions a degree more or less now became a matter of national importance. Meantime Chilean speculators had poured into the debatable territory, and to the boundary question was added the tariff dispute, when the Bolivian Custom-House officers endeavoured to levy increased export duties on the nitrates shipped by a Chilean company at the port of Antofagasta. Thus arose the war of 1879-81, in which Peru sided with Bolivia, and which resulted in the cession by these States of the mineral districts of Tarapaca and Antofagasta to the victorious Chileans. Thus also Bolivia became, at least temporarily, a land-locked Power, while Peru, half-ruined by a disastrous war, lost the prospective means of meeting her ever-increasing liabilities towards her foreign (almost exclusively British) creditors.

The Peruvian Corporation

A compromise had therefore to be effected, and thus was created the so-called "Peruvian Corporation," to which were transferred a large portion of the national

assets, to be developed by them in the mutual interest of the State and of the bond-holders. Thus, in virtue of the Grace-Donoughmore contract, ratified in January 1890, Peru was released from all responsibility in respect of the public debt, which, with arrears of unpaid interest, amounted at that date to £23,000,000, while all the railways, guano deposits, mines, and lands of the State were ceded to the bond-holders for a term of sixty-six years. The expectation that by that time all liabilities would be cleared off has scarcely been borne out so far. Several important details of the agreement still remain unsettled, and at a meeting of the Corporation in London in January 1899 it was stated that the yearly revenue was stationary at about £140,000, just enough to pay the reduced interest upon the debentures.

Administration

Peru, in colonial times the most important of the Spanish South American Viceroyalties, proclaimed her independence in 1821, and after a severe struggle, continued for nearly four years, vindicated the claim in 1824. The present Constitution dates from October 1856, and, as revised, from November 1860. The legislative power is vested in a Senate and a House of Representatives, the latter composed of provincial deputies in the proportion of one for every 30,000 inhabitants, the former of members returned by the electoral colleges of the provinces of each department, generally at the rate of two for each province.

The executive is entrusted to a President and two Vice-Presidents, elected for four years, and assisted by six Cabinet Ministers, dependent on the President. There is little fault to find with the general scheme of adminis-

tration, which since the Chilean war has worked fairly well. Although the Peruvian Corporation exercises no governing functions, it tends indirectly to strengthen the hands of the authorities, by stimulating local enterprise, and thus fostering those industrial habits which make for peace.

Although politically all classes are equal, religious freedom is barred by the terms of the Constitution, which not only recognises Catholicism as the State religion, but also in principle forbids the public exercise of any other form of worship. Practically, however, a measure of tolerance is extended to the Protestant communities (chiefly English and American), which have churches in Callao and Lima.

Elementary instruction is compulsory, and also free in the municipal schools. Even the high schools maintained by the State in the departmental capitals are in great measure free, although a small fee is charged in some places. There are universities at Cuzco, Trujillo, and Arequipa, subordinate to that of Lima, which is the oldest in the New World, its charter having been granted by Charles V. The "Universidad de San Marcos," as this central establishment is called, has a somewhat complete curriculum, including faculties of theology, jurisprudence, medicine, political and applied sciences.

Since the war the land forces have been reduced to about 5000 men of all arms, and the navy to two cruisers, a few small steamers, and a training ship.

ECUADOR
PERU
BRAZIL
or
Region of Woods
La Montaña
Acre
PACIFIC
OCEAN
PERU
Scale 1:6336000 100 English Statute Miles to 1 Inch.
Roads shown thus
Longitude West 70 of Greenwich
London Edward Stanford 12,13 & 14, Long Acre, W.C.

CHAPTER VIII

BOLIVIA

Boundaries, Extent, Population—Physical Features—The Coast Range and the Cordillera Real—The Cordillera de Cochabamba and the Eastern Sierras—The Yungas Zone—Hydrography—The Titicaca Closed Lacustrine Basin—The Madre de Dios and Beni Rivers—The Rio Grande and Mamoré—The Mojos Lacustrine Depression—The Pilcomayo—Climate—Flora—Fauna—Inhabitants The Mojos—The Chiquitos—The Chiriguanos—The Bolivians—Historic Retrospect—Topography—Railway Projects—Resources—Minerals—Vegetable Products—Communications—Administration.

Boundaries, Extent, Population

LANDWARDS Bolivia is conterminous with as many as five different States—Peru and Chile on the west, Argentina and Paraguay on the south, and Brazil on the north and east sides. But the boundaries are almost everywhere purely conventional lines, drawn with little regard to the physical features of the land, and leaving several frontier questions still unsettled. After the war of 1879-81 the littoral district of Antofagasta, nearly 30,000 square miles in extent, was retained by Chile, and for a time Bolivia was reduced to the position of an inland power. Here, by the treaty of 1884, everything south of 23° S. lat. was surrendered in perpetuity, while the section of the Atacama desert between that parallel and the Rio Loa,

former frontier towards Peru, was first mortgaged to Chile, and then in 1895 ceded absolutely, in exchange for the little seaport of Mejillones del Norte between Iquique and Pisagua in the old Peruvian province of Tarapaca. Access to the Pacific was also once more secured by the grant of a narrow strip running through the same province to Mejillones. But against this concession Peru has entered a formal protest, as being against her interests, so that the arrangement can scarcely be considered final.

In the interior the boundary towards Chile was also modified in 1884, and instead of following the crest of the Coast Range it has been deflected a little to the east as far south as the Licancaur volcano, beyond which point it trends slightly south by east to the frontier. Towards Peru, Bolivia claims a contested line drawn from the head of the Rio Yavary to that of the Amarumayo (Madre de Dios), thence to and across Lake Titicaca to the outlet of the Desaguadero, and from that point south-west to the Rio Mauri, which is followed to the province of Tacna, now held by Chile. But Peru makes the line coincide with the course of the Beni from its source to the Madeira. The Brazilian boundary, as fixed in 1875, runs in the north from the head of the Yavary to the Beni-Madeira confluence, and thence along the Rios Mamoré, Guaporé (Itenez), and Verde to the Cerro de Cuatro Hermanos. Here it trends east to the head of the Rio San Matias, which is followed to Lake Uberaba, from which point it is drawn at a little distance from, but parallel with, the right bank of the Paraguay to Puerto Pacheco, and thence along the river itself to Paraguay. With this State the boundary, settled in 1894, forms a straight line between the left bank of the Pilcomayo at 22° S. lat. and the right bank of the Paraguay at Fort Olimpo (21° S.).

By the same Convention of 1894 the free navigation of the main stream was granted to Bolivia, which thus secured an outlet to the Atlantic by the Parana, that river being also free to all flags. By the agreement of 1888 the boundary towards Argentina coincides with 22° S. lat. between the Rios Pilcomayo and Bermejo, follows this river for some distance to the south-west, and then runs west towards the Sierra de Victoria, and round the foot of the Sierra de Santa Catalina to the right bank of the San Juan, which is followed southwards to the Chilean frontier.

Within these extremely arbitrary limits Bolivia has a superficial area of over 605,000 square miles, with a population estimated for 1906 at 1,954,000, distributed over the nine departments and territories as under :—

Departments and Territories.	Area in sq. miles.	Population.
La Paz	53,800	499,089
El Beni	102,100	36,042
Oruro	19,000	96,411
Cochabamba	23,300	367,543
Santa Cruz	141,700	234,743
Potosi	48,900	364,689
Chuquisaca	20,400	228,966
Tarija	70,800	115,233
Colonial Territory	119,400	11,200
Total	605,400	1,953,916

Great uncertainty prevails both in respect of these figures, which are raised by some authorities to 2,270,000, and reduced by others to less than 1,500,000, and also regarding the constituent elements of the inhabitants. These are usually grouped under three broad divisions, —full-blood *aborigines*, numbering from 200,000 to 300,000; *mestizos*, but with a slight European strain, leading sedentary lives in Christian communities,

speaking native languages, and numbering probably about 1,000,000; lastly, the so-called *whites*, that is the civilised ruling class, with a more decided strain of European blood, of Spanish speech, though often familiar with Aymara, concentrated chiefly in the urban, agricultural, and mining districts of the uplands (Bolivia proper), and numbering perhaps 700,000 or 800,000.

It is easy to understand that, under a weak or disorderly administration such as has for the most part prevailed in Bolivia, heterogeneous populations of this sort, with such a large preponderance of the Indian element, must constitute a standing menace to the stability of the State itself. Hence it is that in Bolivia internal disorders often assume a more serious aspect than elsewhere. During the last revolution, which broke out in November 1898, fears were entertained of a general rising of the natives, and such an event—always possible—might lead to the intervention of the neighbouring Powers, if not to the dismemberment of the republic.

Physical Features—The Coast Range and the Cordillera Real

That central section of the Andean uplands which is comprised within Bolivian territory lies roughly between 10° S. lat. and the Tropic of Capricorn, about midway between the parallels of the Amazon and Plate estuaries, and over against the most elevated parts of the Brazilian highlands. It has thus for long ages been somewhat less exposed than the northern and southern sections to the direct action of the moisture-bearing Atlantic winds, and has consequently suffered less from the erosive effects of the running waters, which have caused such a prodigious extent of denudation along the eastern slopes of the Peruvian, Ecuadorean, and Chilean Andes.

The result is that the pristine configuration of the whole system has been better preserved in Bolivia than elsewhere. Here the Andean approach nearest to the Brazilian uplands, and here is developed a far greater breadth of elevated plateau formations than in any other part of the southern continent. The two main ranges, that is to say, the Coast or Western Cordillera, and the Andes properly so called, which in Chile and Argentina are separated only by a relatively narrow tableland, broaden out in Bolivia to such an extent as to enclose one of the most spacious and elevated plateaux on the globe. Moreover both chains, but especially the Andes, throw off a number of secondary spurs and offshoots and even distinct sierras in the direction of the east, by which the Bolivian system is brought at some points within measureable distance of the Brazilian uplands.

To the Coast Range, which is now included in Chilean territory, belong several spurs and lateral ridges, with some lofty summits, such as *Tacora* or *Chipicani*, *Sajama* (21,000 feet), *Sapaya*, *Tua*, and *Viscachillas*, all lying well within the Bolivian frontier. But most of the highest peaks occur in the Andes proper, which traverse the whole region for about 560 miles in the normal direction from south-east to north-west. Like the Ecuadorean and Peruvian systems, the Bolivian Andes have also their converging "knot," which here takes the name of *Apolobamba*, and is formed by the junction of the *Carabaya* range, with the crests rising to heights of 16,000 and 17,000 feet on the north-east side of Lake Titicaca.

The *Cordillera Real* ("Royal Cordillera"), as the section of the Andes is called which skirts the east side of Titicaca, presents a great diversity of aspects in its numerous sharp peaks, conical, dome-like or bell-shaped

summits, penetrating in many places above the snow-line, which here stands at about 17,300 feet above sea-level. In this section are grouped most of the giants of the Bolivian highlands, such as the triple-crested *Illampu* or *Sorata*, probable culminating point of the southern

ILLIMANI.

Continent (23,500 feet?), and its proud rival *Illimani* (22,500), which also terminates in three snowy peaks. The "Pic de Paris," one of the lower crests of Sorata, was scaled by Wiener in 1877, and in September 1898 Sir Martin Conway for the first time ascended the highest point of Illimani. "The last part of the ascent was made by a long ice-wall, and across a huge

snow-plateau, leading finally up a snow-ridge to the summit."[1]

Illimani, which is unsurpassed for its imposing

GORGE NEAR THE CUZANACO MINE, ILLIMANI.

grandeur and varied aspects, rises close to La Paz above the profound gorge through which the Titicaca basin formerly sent its overflow to the inland sea. Beyond

[1] *Geograph. Jour.*, October 1898, p. 417.

this cleft the Cordillera Real is continued for a distance of over 200 miles to the *Cochabamba knot*, which is dominated by the *Cerro Tunari*, 16,200 feet high.

Here the Cordillera bifurcates, throwing off to the left an irregular eastern branch, while the main chain takes a southern trend parallel with the Chilean Coast Range. This southern section, which again breaks into secondary ridges or isolated masses, is surmounted by several lofty summits, such as *Michaga* (17,400 feet), *Cuzco* (17,930), and (east of the main axis) *Chorolque* (18,480), *Guadalupe* (18,900), *Todos Santos* (19,400), and *Lipez* (19,680), culminating point of South Bolivia. Lipez gives its name to a transverse ridge, which closes the southern extremity of the Titicaca-Aullagas depression, and thus corresponds with the Vilcanota knot on the north side of the same lacustrine basin.

The Cordillera de Cochabamba and the Eastern Sierras

The region stretching east of the Cerro Tunari in the direction of the plains presents an extremely rugged aspect, although falling to a much lower level than the great central plateau. In this "Bolivian Switzerland," as it has been called, the highest point appears to be the *Cerro de Potosi* (15,400 feet), formerly a chief centre of the silver-mining industry. Amid a chaos of precipitous heights, detached crests and masses, thrown together without any apparent order, it seems difficult to detect any general plan. It results, however, from the rough surveys already made, that the jagged sierras and short ridges are mainly disposed in the same direction as the two border ranges—the northern *Cordillera de Cochabamba*, which trends east and south-east, and the eastern

Misiones chain, whose outer escarpments rise like an impassable rampart above the alluvial plains.

But the Andean system proper is still continued in the direction of the Brazilian uplands by the *Sierra Chamaya*, the *Sierra Manaya* skirting the right bank of the Beni, the *Cordillera de los Mosetenes*, and several other so-called "Little Andes" ramifying eastwards from the Cochabamba heights. Still farther east the plains about the southernmost sources of the Madeira are diversified by a number of isolated gneiss masses, which appear to have formerly belonged to the older Brazilian system, from which they have been detached by the erosive action of running waters. From the Indians inhabiting their valleys they take the collective name of the *Chiquitos* group, and are of some geographical interest, because they stand at the nearest converging point of the Andean and Brazilian orographic systems.

The Yungas Zone

This Chiquito district properly forms part of the *Yungas*, which is the same word as the Peruvian *Yuncas*. But whereas in Peru the Yuncas comprise the hot dry coast-lands, the Bolivian Yungas, like the Peruvian Montaña, is applied to all the hot, moist eastern slopes of the Cordilleras merging in the wooded Amazonian plains. Both terms are also extended to the natives of the respective regions, and to that extent have acquired a somewhat vague ethnical significance. Notwithstanding the oppressive heat and humidity, and the rank vegetation of this trackless forest zone, the slopes and even the plains watered by the Amazonian tributaries are said to be singularly free from malarious fevers and epidemics.

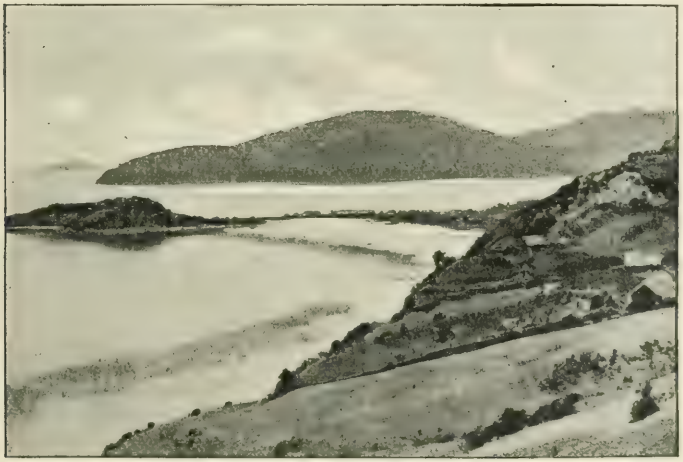
Hydrography

In Bolivia the drainage system is less complicated than might be supposed from the large number of streams traversing the Yungas zone in various directions. Since the recent political changes there is no outflow towards the Pacific Ocean, while the *Alta Planicie Central*, that is, the "High Central Tableland," as the great plateau is called, forms a closed basin with no visible outlet, and is moreover a somewhat arid region, with few and unimportant perennial streams. Hence it is that all the rivers descending from the eastern slopes find their way to the Atlantic Ocean either through the Amazon or the Plate estuaries. It is further to be noted that two only belong to the Plate system—the Parapiti and the Pilcomayo—and that all the Amazonian affluents reach the main stream not through independent channels, but indirectly through the Madeira, largest of its southern tributaries. It thus appears that, from the hydrographic standpoint, the greater part of Bolivia is comprised within the Madeira basin, whose three great western head-streams—the Madre de Dios, Beni, and Rio Grande—collect all the surface-waters of the Yungas district.

The Titicaca closed Lacustrine Basin

To the same fluvial system also formerly belonged the now closed lacustrine basin, which is still flooded in the north and centre by the already described lakes Titicaca and Aullagas. This vast depression, which has a mean breadth of 80 miles between the two main ranges, extends for a total length of 500 miles from the Vilcanota to the Lipez knot, and has an area of perhaps over 40,000 square miles. Hence when flooded it must have been the

largest lake, if not the chief reservoir of the largest river in the world. South of the Aullagas lagoon nothing remains of the old lake except some saline marshy tracts, or "pampas," as they are here called, which occupy the lowest parts of the tableland, and are fed by the *Laca Ahuira*, flowing partly above and partly under ground, south-westwards from Aullagas. Such are the *Pampa de Coipasa*, and still farther south the



LAKE TITICACA.

Pampa de Empeza, which according to the seasons are alternately salt lagoons and dry or swampy plains. The surface consists generally of a thick crust of pure crystallised and dazzling white common salt overlying an underground lake, of which nothing can be seen except where salt-works have been opened by the natives.

In the rainy season these pampas are often flooded to a depth of 2 or 3 feet, and are then quite impassable, but at other times may be safely crossed by avoiding

the deeper marshy parts. A fresh survey of this lacustrine region by Dr. Neveu-Lemaire in 1903 reduced the area of Titicaca to 1970 square miles, with greatest depth 1892 feet off the central Soto Island. Lake Poopo was found to be very shallow, the depth nowhere exceeding 13 feet, although this basin is 55 miles long and 25 miles broad. It stands 400 feet below Titicaca, with which it appears to have been formerly united, and still receives its discharge through the Desaguadero.

The Madre de Dios and Beni Rivers

At present the divide between Titicaca and the Amazon system stands 520 feet above the lake at the La Paz gorge, through which the lake may have formerly found an outlet to the plains. But the great river still draws some of its supplies from the eastern slope of this divide, where the *La Paz* torrent rises on the flanks of Illimani, and is soon after joined by the *Cotocayes*, the *Altamachi*, and several other mountain streams to form the *Beni*, one of the chief branches of the Madeira. After a winding course of several hundred miles through the Yungas district the Beni is joined on its left bank below Carmen by the much longer and more copious *Madre de Dios*, whose farthest head-stream, the *Inambari*, rises not far from the source of the *Madidi*, one of the Beni affluents, and after skirting the escarpments of the Carabaya range in Peru for some distance in the direction of the north-west, as if to join the Rio Purus, bends sharply round to the north-east. In fact the Inambari was long supposed to be the upper course of the Purus, although the Incas had sent expeditions down its banks and appear to have known that the *Mayu-Tata* or *Amaru-Mayo* ("Snake river"), as they called the Madre de Dios, really formed part of the Beni

system. But this fact was afterwards forgotten till the year 1860, when Faustino Maldonado floated down the Madre de Dios to the Beni and the Madeira, where he and some of his companions perished in the cataracts.

The doubts, which even still continued to prevail as to the true relations, were not finally cleared up till 1884, when Armienta ascended from the Madeira and Beni up the Madre de Dios to the point where it passes from Peru into Bolivian territory, and found it a placid navigable stream free of all obstructions and about 550 yards wide. At the Beni confluence, 20 miles above the Madeira, it is over 1200 yards wide, but a little lower down the navigation of the united stream, which retains the name of the Beni, is interrupted by precipitous falls 30 feet high.

The Rio Grande and Mamoré

Far more extensive than the Beni is the Mamoré fluvial system, which with its widely-ramifying branches fills up the whole of the alluvial plains between the Bolivian and Brazilian uplands, communicates during the floods with the upper affluents of the Paraguay, and with some of its head-waters penetrates far into the Cochabamba and Matto Grosso ranges. Thus the *Rio Grande* (*Guapay*), which by many geographers is regarded as the true upper course of the Madeira itself, has its source far to the south not a great way from Oruro on the plateau between the Cordillera Real and the Cochabamba range. After traversing the whole of the plateau in a south-easterly direction, it sweeps round with a magnificent bend to the north and north by west to the Mojos plains, where there is a great meeting of the waters locally known as the *Junta de los Rios*.

Here the Rio Grande is usually stated to take the

name of the *Mamoré*, which it retains for the rest of its course to the junction of the *Itenez* (*Guaporé*) from Brazil to form the *Madeira*. From this it might be supposed that the Mamoré is merely the lower course of the Rio Grande, whereas it is an independent river which converges with the Rio Grande, and its tributary the *Piray* or *Sará*, jointly with the *Yapacani*, the *Chimoré*, and the *Chapari* at or about the Junta de los Rios, above the old mission station of Loreto. All these affluents, which are navigable by canoes nearly to their sources at the foot of the Cochabamba range, merge at the Junta in a single stream, which retains the name of the Mamoré to the Gauporé confluence, although the Rio Grande is much the longer branch, but so shallow that it is quite useless for navigation. The true Junta, described as a magnificent meeting of waters, is at the confluence of the Mamoré, here 500 yards wide, with the Sará, the name given by the natives to the united Rio Grande and Piray, the latter flowing from the Santa Cruz district and joining the left bank of the Rio Grande about 40 leagues above the Junta.

All these rivers are continually shifting their beds in the forest region through which they flow. "They undermine the banks on one side, which, falling away, form the numerous curves on the convex side of which the mud and sand brought down by the current is deposited, and *playas* (shoals) and banks are formed on which a forest grows in course of time. The river on the concave side of the curve is continually causing the trees of the *terra firma* to fall and obstruct the waterway; a barricade or *palisada* is formed, the river then returns in exceptionally high floods to its old course on the convex shore, bursting through the playas and sand-

banks, and so the ever-recurring changes of the river-course continue." Most of this well-watered but hitherto imperfectly-known Yungas region has now been thoroughly explored by several expeditions such as that of Dr. J. W. Evans, who in 1901-2 surveyed the rich Caupolican district in the upper Beni basin. Farther south the district about the Tambopata and Inambari tributaries of the Madre de Dios, which had already been visited by Sir Clements Markham, was traversed in 1902 by one of the expeditions organised by the Peruvian " Committee of Fluvial Highways " to open up the Yungas zone. Here several trading stations were founded, including Port Markham on the Tambopata, and Port Maldonado at the junction of that river with the Madre de Dios.

The Mojos Lacustrine Depression

Above the Gauporé confluence, where the united stream takes the name of the Madeira, the Mamoré with its ramifying affluents traverses that part of the Yungas zone which reaches its lowest level in the *Mojos* plains. Here the divide between the Amazon and Plate basins is still so low that the waters of the head-streams are intermingled during the rainy season, and after the subsidence a number of shallow depressions either remain permanently flooded or else form saline morasses, like the Coipasa and Empeza pampas in the southern part of the Alta Planicie Central.

These lacustrine formations are numerous, especially in the level region between the middle courses of the Beni and the Mamoré, where the *Roguaguado* lagoon is said to cover a space of several hundred square miles even in the dry season. Owing to the same general lie of the land the *Rio Parapiti*, which rises at the base of

the outer escarpments south of the Rio Grande bend, winds with such a sluggish current eastwards in the direction of the Paraguay that it seems at times to be lost in marshy tracts, draining both to the Amazon and Plate basins.

The Pilcomayo

Somewhat more decided, though still in places scarcely perceptible, is the incline of the *Rio Pilcomayo*, which, although it has its source on the uplands close to that of the Rio Grande, belongs entirely to the Plate system. After forcing its way through several intervening ridges to its junction with the *Pilaya* above San Francisco, it flows across the Gran Chaco plains in a normal south-easterly direction to Lambare, on the left bank of the Rio Paraguay six miles below Asuncion, capital of Paraguay. The numerous attempts made to determine the true character of this great fluvial artery, which seemed to possess such vital economic importance for the neighbouring states of Bolivia, Argentina, and Paraguay, have mostly been thwarted, as much by the impracticable nature of the sluggish stream itself, as by the hostility of the fierce Toba natives inhabiting its densely wooded and in places half-submerged banks.

One of the most successful expeditions was that carried out in 1890 by Lieut. O. J. Storm, who, however, was unable to ascend much more than 300 miles above the confluence, in a steamer built for the purpose and drawing only 8 inches when loaded. "The river," this explorer tells us, "has an average width of 30 yards, and its banks are 4 to 5 yards high, covered in some parts with dense forests, while in others the aspect changes into vast plains dotted with palms. There also exist extensive swamps. The depth is very variable,

and entirely dependent on the rainfall. The course of the Pilcomayo is entirely tortuous, with very short and sudden bends, making it difficult even for a small steamer to wind her way through the overhanging trees from both sides, and especially the numerous *raigones* (" snags ") offer great obstacles and even dangers for the navigation. In some parts the raigones are so abundant that the river-bed at low water looks like a forest of dead trees. We had to stop at every moment to cut our way through, and at times the men were scarcely out of water the whole day."[1]

The middle course was surveyed by W. Herrman in 1907, and the lower course in 1906-7 by the brothers Schmied and Gunnar Lange, all in the Argentine service. The result appears to be that the main stream ramifies into three branches, the Rio Confuso, which flows straight to the Paraguay, and the northern and southern arms, the last being the natural course of the river, which enters the Paraguay through Lake Chaja.

Climate

As in the other Andean regions the climates are determined far more by elevation than by latitude; in other words, they are disposed vertically rather than horizontally. Thus, whatever the distance from the equator, the mean annual temperature, which in the Yungas zone stands at about 74° F. up to 2000 feet, falls to 66° on the Cochabamba plateau (8000 to 8500 feet), and to 50° at La Paz and on the central tableland (11,900 to 12,500 feet). Higher up, the slopes and crests of both Cordilleras penetrate into an Arctic region, which is uninhabitable even where not clothed with a

[1] *Geograph. Jour.*, January 1896, p. 84.

snowy mantle throughout the year. The severity of the dry winter season, from April to August, is somewhat tempered on the Alta Planicie by the moderating action of the great lake. But the most favoured zone, where all the large towns and most of the settled populations are concentrated, lies about the lower slopes of the Cordillera Real and the Cochabamba plateau, between the altitudes of 8000 and 10,000 feet, with a mean annual temperature oscillating between 50° and 60° F.

This region is exposed to the dry south-east trade winds, which have lost most of their moisture before reaching the Bolivian uplands, and are followed by the intermittent rains prevailing throughout the wet summer season from November to February. But the rainfall is on the whole less copious than on the more northern slopes, which are exposed to the moist Atlantic winds sweeping up the Amazon valley, and perhaps to this cause, combined with the greater development of the plateau formation, Bolivia may be indebted for its general salubrity and relative immunity from epidemics, even on the low-lying Yungas zone. Here the Coni valley, which drains to the Chapari at the low level of about 950 feet above the sea, and is covered with a less dense and rank vegetation than the montaña, enjoys a delightful climate, where mosquitoes and other insect pests are less troublesome, and "fever and ague are very little if at all known." [1]

Still more favoured is the Cochabamba region, which "enjoys an almost perpetual summer, whilst the nights are pleasantly cool, and therefore invigorating to constitutions depressed by the humid heat of the Madeira and Amazon valleys. There seems to be little difference all the year round. Certain months have more rain than

[1] Mathews, p. 186.

others, but even then the rain only falls in the shape of good, heavy showers, lasting, perhaps, an hour or so, when the sun breaks out again. A thoroughly wet day is a great rarity in Cochabamba, although at higher and lower altitudes, in the same parallel of latitude, such days are of frequent occurrence, while the central plains of Bolivia seem to have just a desirable amount of rainfall and no more. Fever and ague are quite unknown, and if sanitary matters were attended to, Cochabamba might soon be free from diseases of any kind. But unfortunately at present such sicknesses as small-pox and scarlet fever are got rid of with difficulty, owing to the filthy habits of at least four-fifths of the natives, who seem to be quite without any notions of public cleanliness" (*ib.* p. 234).

Flora

But, if less abundant than in the north, the rainfall still amply suffices to sustain a vegetation which for exuberance and variety of forms is probably unsurpassed in any part of the world. Its luxuriance is mainly due to the natural fertility of the soil, while for the astonishing number of distinct species Bolivia has to thank its central position in the southern continent, which has enabled it to attract immigrants from the Peruvian, the Brazilian, and all the other surrounding vegetable zones. Vast forest tracts, abounding in cabinet and dye-woods, medicinal and other useful plants, are continuous along the lower slopes and at the foot of the outer Cordilleras, while some varieties of the ubiquitous palm family range to great heights on the flanks of the Cochabamba mountains.

Amongst the numerous useful vegetable products of the Yungas district may be mentioned an excellent variety

of chinchona, and the copal tree, with its easily extracted resin, by which the natives of the woodlands light up their habitations. Coffee also of prime quality here flourishes side by side with rice, sugar-cane, pine-apples, and coca, which, as in Peru, is extensively used by the Indians of the uplands as a stimulant. The more open savannahs farther south and east yield abundance of the richest pasture, while European alimentary plants, such as wheat, barley, and pulse, are found associated with the indigenous maize and potatoes on the arable upland tracts.

In the Mojos territory the old cocoa plantations, here called "chocolatales," which were laid out by the Indians under the guidance of the Jesuits 200 years ago, are still kept up in the Exaltacion district and other parts. But they are now claimed as Government property, and farmed out to speculators, who make good profits, as the plant needs very little attention, and thrives even if left to itself. The chocolate from these plantations is quite equal, if not even superior, to the highly-prized "Meravilla" of Venezuela, and when the communications are improved will certainly form an important article of the export trade with Europe.

On the uplands *quinoa* and potatoes are amongst the most valuable alimentary plants. Quinoa is a small grain about the size of millet, which, when boiled or soaked, yields a gelatinous substance forming the staple food of the Aymara Indians. Potatoes are largely consumed in the form of *chuño*, that is, sliced and cut into cubes the size of dice and then exposed to the frosty nights till they acquire a dry corky appearance. In this state they keep any length of time, and are much used with *chupé* (soup), although considered tasteless by most travellers.

From maize is obtained the national drink, *chicha*, of which there are two varieties, *chicha cocida* ("boiled") and *mascada* ("chewed"), a concoction prepared, like the Polynesian *kava*, by a process of mastication, and freely taken by everybody, from the president down to the humblest peasant.

Fauna

Bolivia, considering the rigorous climate, has no dearth of indigenous animals on its lofty plateaux. The llama,

CAPYBARA.

alpaca, vicuña, guanaco, chinchilla, viscacha, are far from exhausting the list. In the montaña are the capybara, a large rodent, the peccary, tapir, and many other useful animals. Almost every form of South American bird-life is met in the woodlands or on the uplands, amongst them some lovely varieties of the humming-bird, frequenting the highest slopes of the Cerro de Potosi over 14,000 feet

above sea-level. In the Yungas district is met an indigenous species of stork, locally called *bata*, which stands about 5 feet high, covers 8 feet 6 inches with its extended wings, and has a curiously up-turned black beak about a foot long. Its flesh makes excellent eating, although this is, perhaps, a point of little consequence in a country where nearly all beasts, birds, and fishes are indifferently consumed not only by the aborigines but also by many of the half-breeds.

On the highlands the llama is used as a pack animal, and the alpaca for its wool. Both these valuable animals are domesticated. The vicuña is wild, and roams freely in herds of from four or five to forty or fifty, keeping mainly to the central plateau. Here the characteristic carrion birds are the condor, eagle, and vulture, which prey upon the mules and other animals falling exhausted along the caravan tracks. "Often, when riding over the Andes, a huge dark shadow comes suddenly over the path, and the traveller, looking upwards, sees the magnificent condor floating in the bright sunlight, and rising to his resting-place amongst the snow-clad peaks" (Matthews, p. 336). All share in the same feast, precedence being taken by the condor, who is followed in their turn by the eagle and the vulture.

Inhabitants—The Mojos

In Bolivia the transitions between the different ethnical and cultural groups are perhaps less abrupt than in most other parts of Spanish America. The natives of the seaboard and of the uplands—Atacameños, Aymaras, and Quichuas—had all been organised in settled communities by the conquering Incas, while the unreclaimed aborigines of the eastern slopes and plains appear for the most part to have always been farther removed from the

savage state than the Chunchos and the other fierce wild tribes of the Peruvian montaña. Even those who, like the *Yuracarés* of the Mamoré head-streams, are still called *barbaros*, are "much quieter and more tractable than the mixed races of Brazil," and in fact are really *mansos*, that is, "tame," being called barbaros only "because they refuse to be baptized into the Roman Catholic Church."[1] Soon after the Spanish conquest large numbers of the Yungas tribes proved highly susceptible to humanising influences, and readily grouped themselves in permanent and orderly communities round about the missionary stations along the banks of the Rios Beni, Mamoré, Guaporé, and their numerous affluents.

Two of these groups—the *Mojos* and the *Chiquitos*—comprise each a great many separate tribes, speaking ten or twelve different languages, yet all living in perfect harmony and combining together for the common welfare.

The Mojos, who give their name to the old lacustrine depression between the Beni and the Mamoré, had already voluntarily submitted to the Inca Yupanqui, and were afterwards gathered by the Jesuits into fifteen mission villages, where they still number about 30,000.

Their Christianity, however, in which Catholic dogma plays a very subordinate part, is sometimes associated with some extremely rude and realistic observances. Indian dances are allowed, at certain feasts, to be introduced after the service of the mass.

These Mojos Indians are amongst the most orderly, industrious, and intelligent inhabitants of the republic, although treated worse than slaves by their Bolivian masters. They are described as "a grave, sedate, and thoughtful people," good husbandmen, skilful in the use of the lasso, which they have adopted instead of the

[1] Mathews, pp. 81 and 174.

bow and arrow, and are regarded as perhaps the most expert boatmen in the whole of the Amazonian region. They are met in this capacity at all the riverine ports as far as Manaos on the north side of the Amazon, and are everywhere highly esteemed and trusted by the white traders. Although their arithmetic gets no farther than the numerals 4 or 5, the Mojos are amongst the few South American peoples who were credited with a writing system, which, however, consisted of nothing more than a few simple strokes drawn on wooden tablets.

The Chiquitos

More rudimentary even than the Mojo numeral system is that of the Chiquitos, some of whom appear to have no terms for the ciphers beyond *one*.[1] Yet they are a bright, intelligent people, more cheerful than the Mojos, and equally industrious. Their collective Spanish name, *Chiquitos*, meaning "Little Folk," does not refer directly to their stature (though that is short, averaging about 5 feet or less), but to the circumstance that when the whites first invaded their territory they found the doorways of the huts so very low that the natives who had fled to the woods were supposed to be dwarfs.

The Chiquitos, who occupy the district about the head-waters of the Rio Guaporé in Brazil, and parts of the province of Santa Cruz de la Sierra, in Bolivia, have developed a sort of communistic or co-operative system, which works better than similar systems in more civilised lands. The produce of their cotton and sugar-cane crops is sold for the benefit of the community,

[1] Even *etama*, the word used for *one*, really means "alone," one object taken apart from the rest (Dr. L. L. Conant, *The Numeral Concept: Its Origin and Development*, 1896).

and a fund is thus formed for the relief of the infirm and aged. For reducing the sugar they make their own copper boilers, and also ply several other trades, such as straw-plaiting, weaving, and dyeing. When they fancy striped trousers, rows of white and yellow cotton are planted, and when blue is fashionable, a row of indigo is added. Coffee, cacao, and vanilla are also grown, and the Chiquitos, who trouble themselves little about politics, may claim to rank amongst the most useful citizens of the adjacent republics.

Their happy, light-hearted disposition, shown by a constant round of visits accompanied by much music and revelry, is all the more remarkable, since the position of their territory about the Spanish and Portuguese frontiers exposed them to endless troubles during the lawless times of the colonial régime. First attacked and butchered by the ferocious adventurer, Alvarez, surnamed *Cabeza de Vaca* ("Cow-Head"), they were next raided from the Portuguese side by the Paolistas in quest of slaves for the mines and plantations of Brazil, and then plundered from the opposite quarter by the Spanish traders of Santa Cruz de la Sierra. Even the Jesuits, who came to evangelise them in the seventeenth century, were accompanied by small-pox and other epidemics which threatened to exterminate the whole nation. Yet they still survive, to the number of certainly over 20,000, divided into as many as forty distinct tribes speaking about a dozen different languages.

The Chiriguanos

Still more numerous are the Chiriguanos, a large branch of the Guarani race, who have from remote times been separated by wide spaces from the kindred people of Brazil and Paraguay. A considerable section are

settled as nominal Christians in the stations along both sides of the Rio Grande. The bulk of the nation are still in the wild state, roaming the forests right up to the foot of the Bolivian Andes. But even these children of nature bear a good character, and have the reputation of being of industrious habits, and good stock-breeders. They also till the land in some districts, and even seek employment in various capacities amongst the settled populations. The Chiriguanos were formerly noted for their strict observance of the strange custom of the *Couvade,* which is prevalent amongst so many of the South American aborigines.

The Bolivians—Historic Retrospect

Of the civilised ruling classes, some are of pure Spanish descent, while many are Mestizos. Their country, in colonial times, was the Presidency of Upper Peru or Charcas.

Upper Peru was under the Peruvian Viceroyalty until 1776, when it was transferred to Buenos Ayres. After the Independence it was formed into a separate republic with the name of Bolivia, in honour of Bolivar, the Colombian General. His lieutenant, General Sucre, was the first President, 1826-28. Santa-Cruz, a pure Indian, established a firm administration from 1829 to 1839. He was a man of undoubted ability and enlightened views. Unfortunately he was also ambitious, and his interference in the internal affairs of Peru in 1836 ended in irretrievable disaster. After his decisive victories over the Peruvian generals, Gamarra and Salaverry, he united the two republics in a confederacy based on an offensive and defensive alliance, which was aimed especially at the aggressive policy of Chile.

The challenge was accepted by that State, which invaded Peru, seized the capital, and not only overthrew Santa Cruz himself with great slaughter at the battle of Yungai in 1838, but also broke up the Confederacy by sowing dissensions between the two allies. The tide of invasion was now directed against Bolivia, and although Gamarra was again defeated, Santa Cruz was not restored to power, because accused by his enemies of aiming at a dictatorship, or even at royalty itself. Since the retirement of Santa Cruz, Ballivian (1841-47) and Linares (1857-61) have been enlightened rulers; and since 1880 seven presidents have served their regular terms of four years. One of the best was Ismael Montes, elected in 1904.

Topography—Railway Projects

In 1828 the constitutional capital of Bolivia was declared to be Chuquisaca, or Sucre. The actual capital and centre of trade is La Paz. The subjoined table shows that there were other towns with over 10,000 inhabitants in 1906, and these are mostly situated either on the central plateau or in the upland zone east of the Cordillera Real :—

La Paz	67,000	Oruro	21,000
Sucre	24,000	Santa Cruz	20,000
Cochabamba	25,000	Huanchaca	10,000
Potosi	23,000	Tarija	8,000

Of these places two only—*Oruro* and *Huanchaca*—stand on the central tableland, and these are consequently amongst the most elevated towns in Bolivia. Oruro, which figures largely in the local records, claimed to be, next to Potosi, the largest city in the whole of the present Bolivia during the seventeenth century, when the population approached 80,000. It stands at an altitude of

11,720 feet at the northern extremity of Lake Aullagas, not far from the now exhausted or abandoned silver-mines to which its prosperity was due. The neighbouring tin-mines are still worked, and the output has even been increased since the extension of the Huanchaca railway to Oruro. Huanchaca, till lately an obscure hamlet 13,500 feet above sea-level, lies due south of Oruro in a rich argentiferous district, overlooking the saline plains of the Pampa de Empeza.

Mining operations have been greatly stimulated by the completion of the Chilean trunk line from Antofagasta on the coast to Huanchaca, and at present this district yields more silver ores than all the rest of Bolivia. The railway is eventually to be continued from Oruro along the western foot of the Cordillera Real and round the shores of Lake Titicaca to Puno, where a junction will be effected with the Central Peruvian system.

On the eastern slope of the Cordillera by far the most important place, although not the present capital, is the famous city of *Nuestra Señora de la Paz* ("Our Lady of Peace"), which was so named by its founder, Alonzo de Mendoza towards the middle of the sixteenth century, but was re-named *La Paz de Ayacucho* ("The Peace of Ayacucho"), after the decisive battle of Ayacucho, which was to secure peace to the country by the expulsion of the Spaniards.

La Paz stands 12,470 feet above the sea, under the shadow of Illimani, at the source of a stream which flows to the Beni through the cleft in the Cordillera Real, by which Lake Titicaca perhaps formerly communicated with the Amazon basin. By the piercing of the narrow pass at the head of the gorge between the two basins a line has been opened from La Paz to Guaqui on south-

west side of the lake, and a line 309 miles long also connects Ollagüe with Oruro on the Antofagasta railway. In 1904 a treaty with Chile arranged for the construction of several other lines, and when these are completed the Bolivian system will have a length of over 2000 miles.

Sorata, at the head of the Rio Sorata, one of the numerous auriferous affluents of the Beni which rise

LA PAZ DE AYACUCHO.

on the eastern slope of the Cordillera, is at present an attractive health resort, much frequented by the citizens of La Paz. But the name is still remembered in connection with one of the most tragic incidents that took place during the widespread revolt of the Indians against their Spanish oppressors in the latter half of the eighteenth century. A large number of whites from the surrounding districts had taken refuge in Sorato, where they hoped to hold

out till relieved by the forces engaged in stamping out the revolt. But the insurgents, instead of coming to close quarters, adopted the novel device of constructing a large reservoir above the town and then removing the dam, with the result that the whole place, with its overcrowded streets and houses, was swept away in a deluge of slush and water.

On the extremely fertile and salubrious plateau watered by the head-streams of the Rio Grande is situated the large city of *Cochabamba*, which gives its name to the Cochabamba range. It is the chief agricultural and industrial centre in Bolivia, and one-fourth of the whole trade of the country is concentrated in this flourishing district. The chief industries are cotton and woollen spinning, tanning, brewing, soap and starch works, while the rich soil yields heavy crops of wheat and other cereals.

Beyond the Cochabamba range the entrance to the plains is guarded by the outpost of *Santa Cruz de la Sierra*, a name familiar to all travellers and explorers in those low-lying borderlands between the Brazilian and Andean highlands. Thanks to the navigable waters of the neighbouring Rio Mamoré, and the well-known tracks radiating in all directions over the land, Santa Cruz has long been the headquarters of the exploring expeditions, which have happily succeeded the former raiding incursions into the Chiquitos territory, Paraguay, and the West Brazilian wilds.

On the uplands drained by the head-streams of the Pilcomayo stand the renowned but now decayed cities of *Potosi* and *Sucre*, the latter since 1894 capital of the republic. Potosi, whose mining operations at one time controlled the money markets of the world, was in the seventeenth century the largest city in the whole of

America, with a somewhat fluctuating population of from 100,000 to 160,000. Thus was, at least, for a time, justified the proud title of *Villa Imperial* bestowed upon it by its founders in 1545. Its better known name is taken from the lofty Cerro de Potosi (15,400 feet), from which it derived its fame and prosperity, and which has been described as a "silver" peak.

But the almost incredibly rich argentiferous lodes, pierced in all directions by deep-sunk shafts and lateral galleries, could not last for ever, especially after most of the 5000 subterranean passages had subsided when the lowest pits became flooded with water. Some of the mines are, no doubt, still worked, but their yearly output of about £150,000 is scarcely one-seventh of their former yield. This must have averaged considerably over £1,000,000 for the 300 years, which, according to some estimates, yielded a total sum of about £340,000,000.

Standing at the tremendous altitude of 13,325 feet above the sea, within 2000 feet of the summit of the Cerro, Potosi enjoys the unenviable distinction of being absolutely the highest abode of man in the southern continent. It lies, in fact, several hundred feet above the strictly inhabitable zone, in a region where the atmosphere is so rarefied that most of the children either die soon after birth, or else never acquire the faculties of sight and hearing. So greatly does the mortality exceed the birth-rate that the population can be maintained only by a constant inflow of adults attracted to the few mines still kept open. When the last of these is closed, Potosi, with its sumptuous monuments, already disused mint, and aqueducts far beyond the requirements of its present inhabitants, will be entirely deserted, and to future generations its extensive ruins may prove as great

a wonder as those of Tiahuanaco now do to the few wayfarers wandering over the scarcely inhabitable southern shores of Titicaca.

At a short distance to the north-east of Potosi, but at a much lower elevation (8860), Sucre, the present ephemeral capital of the republic, occupies a pleasant and healthy position close to the Cachamayo head-stream of the Pilcomayo. It stands on the site of the old Indian settlement of *Chuquisaca* (*Chuquichaca*), that is, the "Golden Bridge," now re-named *Sucre*, in honour of the general who gained the great victory of Ayacucho over the last of the royalists. In the halcyon days of the mining industry, when Potosi was minting the currency of half the civilised world, Sucre served as a health resort for its sickly inhabitants. At present it owes its prosperity, not to the mineral but to the vegetable kingdom, the surrounding district being one of the most fertile in the State. A curious local industry is the preparation of argillaceous bon-bons, which are sucked like liquorice-sticks, without any injurious effects, if used in moderation. All over these uplands "clay dumplings and potatoes" are a favourite dish, and we know that other edible earths are largely consumed by many of the aborigines both in South America and in Africa, but not everywhere with impunity.

On a tributary of the Bermejo, which takes its rise within the Bolivian frontier, stands the outpost of *Tarija*, a place which in recent years has acquired some notoriety as a convenient refuge of "politicians out of office," and other turbulent citizens of the neighbouring Argentine republic. The district is more favourably noted for its excellent soil, which yields magnificent crops of cereals, vegetables, and fruits of all kinds. As on the Cochabamba plateau, the herbage is extremely nutritious, so

that in the whole of this region there is a great future for the stock-breeding industry.

Resources—Minerals—Vegetable Products—

Despite the loss of the rich mineral districts of the Pacific slope, wrested from her by Chile, Bolivia still possesses in the Huachaca and Oruro mines some of the most productive argentiferous lodes in the world. Here the ores contain nominally from a tenth to a fifteenth part, and exceptionally as much as one-half or even three-quarters of pure metal. In 1905 nearly 1,850,000 pounds weight of silver were exported, and the output will certainly increase with the development of railway enterprise on the Central plateau.

Next in importance to silver are the tin beds, which occur at short intervals all along the east side of the same region, and thence southwards nearly to the Argentine and Chilian frontiers. These beds are found especially in the trachitic porphyries and other plutonic rocks, which crop out through the older schists, and in some places the ores consist of more or less pure metal. In 1906 the total export of tin was valued at £1,300,000. Copper also abounds, especially in the La Paz district, where the famous Corocoro and Chacarilla mines contain ores with as much as 85 per cent of pure metal. In the same year, 1906, the value of the copper exported exceeded £3,000,000.

Gold is widely diffused, but nowhere in large quantities, except perhaps in some of the imperfectly surveyed auriferous reefs in the province of Santa Cruz. Gold quartz veins of surpassing richness are also said to occur on a branch of the Rio Baure or Blanco, which flows entirely through Bolivian territory to the left bank of

the Guaporé. Salt abounds in the southern provinces, but coal and iron appear to be rare, although carboniferous beds are reported in the Titicaca basin. Platinum, antimony, bismuth, and arsenic also figure amongst the minerals, the total annual yield of which averages about £2,500,000.

On the uplands wheat, barley, and other cereals of good quality are raised, but in quantities insufficient to supply the local demand. The same remark applies to the produce of the lower and warmer zones, which are well suited for the cultivation of maize, cotton, tobacco, coca, coffee, sugar, and even wine. But the development of the agricultural industry is everywhere retarded by the lack of good communications.

Of forest products the most important have hitherto been chinchona and rubber. The latter, especially since about the year 1880, has engaged the attention of foreign speculators to the neglect of almost all other economic growths. In Bolivia the rubber-yielding plant is the *Siphonia* (*S. elastica*), of which there are three distinct varieties growing to a height of 50 or 60 feet. In recent years the enterprising traders engaged in this industry have indirectly helped more than any other class to open up the country, to survey its navigable waters and promote geographical research in all directions.

Communications

But all real progress is arrested by the lack of good communications in almost every part of the republic. In the Yungas zone the routes traversing the woodlands and more open pampas are merely bridle-paths, while the numerous navigable affluents of the Madeira are frequented only by the canoes of the Mojos and other aborigines.

Even the highways between such important places as Cochabamba and Sucre are in the same wretched state as they were some forty years ago, when Don Rafael Bustillo described Bolivia as a region seated upon the masses of silver of the double Andean range, a territory fertile beyond measure, where the treasures of the most opposite climates were grouped together, "but perishing from consumption for want of means of communication, which might carry to the markets of the world her valuable productions. For the railway projects see p. 259.

Administration

By the present constitution, which dates only from October 1880, the executive is vested in a President elected by popular vote for four years, and not eligible for re-election. The legislative functions are entrusted to a Congress of sixteen Senators and sixty-nine Deputies, both elected by the suffrage of all adults who can read and write, the former for six the latter for four years. The President is assisted by two Vice-Presidents and a Cabinet of six ministers.

Although the Roman Catholic is the State religion, a measure of tolerance is extended to other forms of worship, at least in those districts where it would be difficult to enforce conformity.

Primary instruction is free and in principle obligatory. Yet in 1906 there were only 710 primary schools attended by less than 49,000 pupils, besides 10 secondary schools and colleges with 2530 scholars. On the other hand, there are no less than six "universities," generally with three faculties (law, medicine, and divinity), and a collective attendance of 680 students. For the settled Indian communities there are 70 schools conducted by

the padres, besides 34 mission stations with 160 schools supported partly by the State, partly by the provinces. It is pleasant to read that in the Mojos missions "all who have done service in the churches as sacristans and choristers are able to write; they also can read music, for which they use the ordinary five-line system. There are small schools in all the principal Indian villages, in which reading, writing, and Catholic prayers are taught in the Castilian language; and I was rather surprised to see the amount of rudimentary knowledge that is drilled into the Indians, who as a race are not at all deficient in natural intellect." [1]

For the administration of justice there are a Supreme Court in the capital, eight district courts, and the courts of the local magistrates.

Besides a regular force of 2500 men there is a national guard, in which all citizens are liable to serve. According to the conscription law of 1892 military service is compulsory in the standing army, the reserve and extraordinary reserve.

[1] Mathews, p. 127.

BOLIVIA

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BRAZIL
Unexplored
MATTO GROSSO
BENI
MOJOS
SANTA CRUZ
CHUQUISACA
POTOSI
TARIJA
PARAGUAY
ARGENTINA
PACIFIC OCEAN
Lake Titicaca
Lake Poopo
Salar de Uyuni
Cordillera Real
Cordillera Occidental
Cordillera Oriental
Cordillera de Los Frailes
Cordillera de Chichas
Cordillera de Lipez
LA PAZ
ORURO
COCHABAMBA
Marsh
Unexplored
Apacari Village
Rio Guaporé
Rio Mamoré
Rio Madeira
Rio Beni
Rio Grande
Rio Pilcomayo
Rio Bermejo
Rio Paraguay
Rio Itenez
Rio Blanco
Rio Negro
Rio Abuna
Rio Orton
Rio Desaguadero
Rio Mauri
Rio Pilaya
Rio Pilaga
Rio Parapiti
Rio Tarija
Rio Grande de Tarija
Rio Pilcomayo
Rio Verde

CHAPTER IX

CHILE

Extent—Boundary Questions—Area—Population—Physical Features—The Central Plain—The Western Cordillera—The Cordillera de los Andes—Mercedario, Aconcagua, Tupungato—The Southern Andes—Igneous and Glacial Phenomena—The Chilean Archipelagoes—Magellan Strait—Tierra del Fuego—King Charles South Land—Mas a Fuera; Juan Fernandez—Hydrography—The Chilean Coast Streams—Lakes—Climate—Flora—Fauna—Inhabitants—The Araucanians—The Fuegians—Yahgans and Alacalufs—The Chileans—Topography—Railway Enterprise—Natural Resources—Agricultural and Mineral Wealth—Land Tenure—Emigration—Administration.

Extent—Boundary Questions—Area—Population

CHILI (properly Chile), which by a curious coincidence has in Quichuan the same meaning as the English word *chilly*, was the name given by the Incas to the coast region stretching for an unknown distance southwards beyond the river Maule,—southern boundary of their empire. At present the same term, expanding with the northern and southern expansion of the Chilean State since the establishment of its independence in 1818, covers the whole of the Pacific seaboard between 20° and 55° S. lat., that is to say, from the Peruvian frontier nearly to the extremity of Tierra del Fuego. But it extends scarcely anywhere much more than 100 miles inland, so that

with a mean breadth of perhaps not more than 70 miles the total length falls little short of 3000 miles. Such an extraordinary conformation, for which no parallel can elsewhere be found, would be impossible in the case of a completely land-locked State, but is an element, not of weakness but of strength, for Chile, which, thanks to the vast development of its coast-line, has easily acquired the command of the neighbouring seas, and thus become one of the most vigorous and aggressive powers in the New World.

Landwards Chile is conterminous only with Peru and Bolivia, where the frontiers have already been described, and with Argentina, where the frontiers, badly defined by more than one convention, have long been a subject of litigation at several points. By mutual agreement the whole question was referred in 1898 to the sovereign of England, and King Edward's award, issued in 1902, has been accepted as final by both parties. By the convention of 1881, the crest of the Andes, which had hitherto been generally but wrongly regarded as the true continental water-parting between the eastern (Atlantic) and the western (Pacific) oceans, was taken as the political divide between the two conterminous States of Chile and Argentina from their first point of contact about 22° S. southwards as far as 52° S. Then the line was made to coincide with the same parallel as far as 70° W. long., from which point it was deflected slightly to the south so as to strike Cape Dungeness on the north side of the Atlantic entrance to Magellan Strait. In Fuegia the parting-line followed the meridian of 68° 34′ from Cape Espiritu Santo to Beagle Channel, all the islands south of which were assigned to Chile. Thus Cape Horn fell to Chile, and Staten Island to Argentina, while Magellan Strait was declared neutral

and free to all flags, and all this part of the convention holds good for both contracting parties.

Not so the mainland, where it was soon discovered that at several points the crest of the Andes in no way coincided with the water-parting between the two oceans. Thus the exploration of the Rio Aysen carried out by Dr. Steffen and others in 1897 showed that, like other recently surveyed Pacific Coast streams, this river "has its sources far to the east of the principal chain of the Andes, its basin stretching over the comparatively level country traversed by the eastern sub-Andean ridges."[1] Here the water-parting "seems to run, in the north, between the Aysen and Lakes Fontana and La Plata," and in the south at a considerable distance beyond the farthest point reached by the expedition on the southern arm of the Aysen, named by Dr. Steffen and his companions Rio Simpson" (*ib.*). On the other hand, the divide in some districts approaches so near to the Pacific that were it followed the Patagonian part of Chile would be cut into a number of practically isolated sections. To remedy this, another convention made in 1893 took as the political divide the water-parting in the main chain of the Andes, so that the frontier, instead of coinciding with the so-called continental divide, would have to cross the rivers flowing from the easternmost crests of the main Andean range. But when the new boundary came to be laid down fresh difficulties arose, and these have all now been removed by King Edward's award. The boundary line thus laid down between the two States is of an extremely intricate character, and will best be studied on the accompanying maps, pp. 326 and 372.

Within its new confines Chile has an area of nearly

[1] *Geogr. Jour.* February 1898, p. 184.

308,000 square miles, with a population (1906) of 3,400,000 distributed amongst its 23 provinces and 1 territory as under :—

Provinces.	Area in sq. miles.	Population.
Tacna	9,248	28,487
Tarapacá	18,125	105,023
Antofagasta	46,597	70,830
Atacama	30,720	75,567
Coquimbo	13,457	200,423
Aconcagua	5,485	135,163
Valparaiso	1,953	270,466
Santiago	5,663	531,016
O'Higgins	2,280	98,633
Colchagua	3,855	191,126
Curicó	2,978	127,558
Talca	3,830	150,620
Linares	3,941	124,389
Maule	2,474	146,644
Nuble	3,406	187,908
Concepcion	3,252	264,549
Arauco	2,446	73,051
Biobio	5,245	108,920
Malleco	2,973	118,387
Cautin	5,830	96,139
Valdivia	8,647	81,286
Llanquihué	45,502	100,935
Chiloe	8,590	98,664
Magallanes (*Ter.*)	71,105	13,144
Total	307,620	3,399,928

The present population includes about 50,000 full-blood Indians, chiefly Araucanians, mostly on the western slopes of the Andes, and nearly 100,000 foreigners. As shown by the subjoined table, contingents from various parts of the civilised world have in recent years been attracted in considerable numbers to the Chilean republic by the inducements held out to permanent settlers on the land, although trade and the

industries are far from being as flourishing as would appear from official representations:—

Peruvians	40,000	Spaniards	3,000
Bolivians	16,000	Swiss	2,000
Argentines	10,000	Chinese	2,000
Germans	8,000	Americans	1,000
English	6,000	Australians	750
French	5,000	Scandinavians	500
Italians	5,000		
		Total	99,250

Physical Features—The Central Plain

Within the present Chilean domain is included the whole of that section of the Andes which is disposed in the direction from south to north, and comprises about one-half of the entire length of the system, measured from Fuegia to the Atrato. Thus Arica, where the system begins to bend round to the north-west, and where the Chilean section terminates, lies under 19° S. lat., that is to say, allowing for the curvature of the northern section, stands about midway between Magellan Strait (55° S.) and the Gulf of Darien (9° N.).

On an ordinary map of the southern continent the narrow Chilean half of the system looks like a mere strip of coast-lands traversed by a single mountain range, so that it is difficult at first sight to understand that here also the double formation—Coast Range and Andes proper, with the intervening plateau and cross-ridges—is maintained, though not throughout the entire length of 3000 miles, between Peru and Fuegia. But in Chile proper, apart from the territory wrested in 1880 from Bolivia, the outer Cordillera almost disappears at both ends, in the north by erosion or possible subsidence, in the south by actual submersion beneath the waters of the Pacific, though even here it is still represented by

the insular chains fringing the coast from Chiloe to South Fuegia.

But in the central region the outer range stands out conspicuously, especially when viewed from the sea, and maintains a considerable elevation for about 700 miles between 30° and 40° S. lat. Here is developed the great central valley of Chile proper, which is enclosed between the outer and inner ranges, and in and about which, as on the corresponding Alta Planicie of Bolivia, are situated the capital, Santiago, with its flourishing seaport, Valparaiso, and most of the large centres of population.

The Western Cordillera

In the old Bolivian provinces, where the Western Cordillera forms the divide between the Pacific and the closed Titicaca-Aullagas basin, the range is surmounted or flanked by several snowy summits of igneous origin and of great altitude. Such are *Tacora* (19,800 feet), source of the Maure, which flows to the Desaguadero; *Chipicani* (20,000 ?), dominating the *Huailillas* Pass, which is itself nearly 14,000 feet high; *Pomarapé* (20,500), which still emits smoke; *Parinacota* (20,950) and *Huallatiri* (19,720), near Lake Chungarra. Farther south the Western Cordillera, whose loftiest peaks, *Yabricoya* and *Tata Yactura*, scarcely fall below 17,000 feet, develops east of Iquique a table-like formation, and is consequently locally known as *La Mesa*.

In the Atacama region, a little farther south, this formation breaks into a number of relatively low ridges, mostly running north and south, rising above 10,000 feet in the *Caracoles* ("shell") heights, but falling to less than 5000 feet on *Mount Trigo* on the coast, about 25° S. lat. Beyond this point the western system can no

longer be distinctly followed till it again rises to a height of 6000 or 7000 feet in the ridge west of *Chacabuco* between Valparaiso and Santiago. This ridge, culminating in *Mount Colliguai* (7320 feet), south-east of Valparaiso, is pierced by a number of easy passes, which represent the gorges through which the lacustrine waters formerly flooding the central Chilean plain were discharged westwards to the Pacific. In this respect the southern depression presents a striking contrast to the Titicaca basin, which, as already seen, probably sent its overflow eastwards to the Atlantic.

Farther south the coast system decreases continually in height through the *Nahuelbuta* range (5000 feet) in the Araucanian territory to the Cordillera Relada and other low ridges in the province of Valdivia, all of which fall below 3000 feet. It was in this region that Darwin and some other observers were led to infer a general upheaval of the seaboard from the terrace formations resembling old marine beaches, and the beds of marine shells, all now standing at considerable elevations above the present sea-level. But the point has been contested, and while some attribute the terraces at the issue of old river valleys to the erosive action of running waters, others suggest that the shell-heaps may be mere kitchen-middens accumulated by the aborigines in a region which is now known to have been inhabited since Pleistocene times. In Fuegia and on the Atlantic side (Brazil and Argentina) such middens exist in great numbers, and are often of prodigious size. One explored by Dr. Lovisato in Elizabeth Island, although greatly eroded by the surf, is still nearly a mile long, and presents many indications of vast antiquity. In any case the upheaval can scarcely have been so general as formerly supposed, because signs of the opposite phenomenon of subsidence have

been observed in one of the neighbouring Chonos Islands.

Beyond the province of Valdivia the Coast Range disappears altogether, or perhaps it would be more correct to say, here breaks into a long chain of islands, which, beginning with Chiloe, skirt the seaboard to the extremity of the Continent, and are continued in a graceful curve through the South Fuegian groups round to Staten Island, where the Andean lands appear to terminate. Corresponding with the break up or subsidence of the Western Cordillera is the continuous southward incline of the great Chilean central valley down to sea level. Contracting here and there to mere gorges or level glens, the central plains develop in Valdivia a series of lacustrine basins — *Calafquen, Huanche, Ranco, Llanquilhue* — through which they merge at last in the inner waters, fjords, sounds, and inlets flowing between the mainland and the line of outer archipelagoes. Some of these channels penetrate far inland, others expand into wide passages, such as the Gulfs of *Corcovado* and *Penas, Nelson* and *Magellan Straits,* and *Beagle Channel,* by which the long chain of fringing islands is disposed in a number of more or less distinct insular groups.

The Cordillera de los Andes

Behind and above all these outer formations—coast ranges, lateral ridges, central plains, archipelagoes, and waterways—the Cordillera de los Andes, properly so called, forms a magnificent background, running without interruption for some 3000 miles along the eastern frontier, with numerous peaks towering many thousand feet above the snow-line, and in mighty Aconcagua possibly reaching the culminating point of the New

World. But, like the central valley and the coast range, the great Cordillera also falls generally in the direction of the south. A good sectional map of the whole system shows that, after maintaining a mean altitude of about 15,000 feet in the north, where *Copiapo, Bonete, Mercedario, Aconcagua, Tupungato,* and some other peaks rise to and above 20,000 feet between the parallels of 27° and 34° S., the main axis has in the south an average height of scarcely more than 8000 feet, with very few peaks rising above 10,000 or 11,000 feet.

The Cordillera, interrupted by Magellan Strait in the wedge-shaped peninsula terminating with Cape Froward at the extremity of the Continent, reappears in the main island of Fuegia, where Mounts Sarmiento (6910 feet), Darwin (6800) and the Three Brothers (1640), all lying north of Beagle Channel, seem undoubtedly to belong to the Andean system proper.

In the Chilean section of the system both igneous and glacial phenomena prevail to a far greater extent than in Bolivia or Peru. Most of the cones, however, are either quiescent or quite extinct, while some of the loftiest, including both Aconcagua and Tupungato, have lost all traces of their former craters. In the northern section, between the Bolivian frontier and Coquimbo, that is, along the eastern edge of the Atacama region, are concentrated over thirty extinct or dormant volcanoes, such as *Llullayacu* (21,650 ?), *Antofalla* (20,900), *Socompa* (19,600), *Azupe de Copiapo* (19,700) and others exceeding 17,000 feet. South of Copiapo the main range develops a plateau formation, which is crossed by relatively low passes, such as the *Portezuelo de Come Caballos* (14,530 feet), leading to the mining district of Famatina in Argentina. In summer the *pampas,* as the level open tracts are locally called, afford easy communication between

the interior of the Continent and the seaboard. But in winter they are difficult and even dangerous to cross, owing to the prevailing high gales, accompanied by intense cold, these exposed uplands offering scarcely any shelter to the wayfarer.

Mercedario—Aconcagua—Tupungato

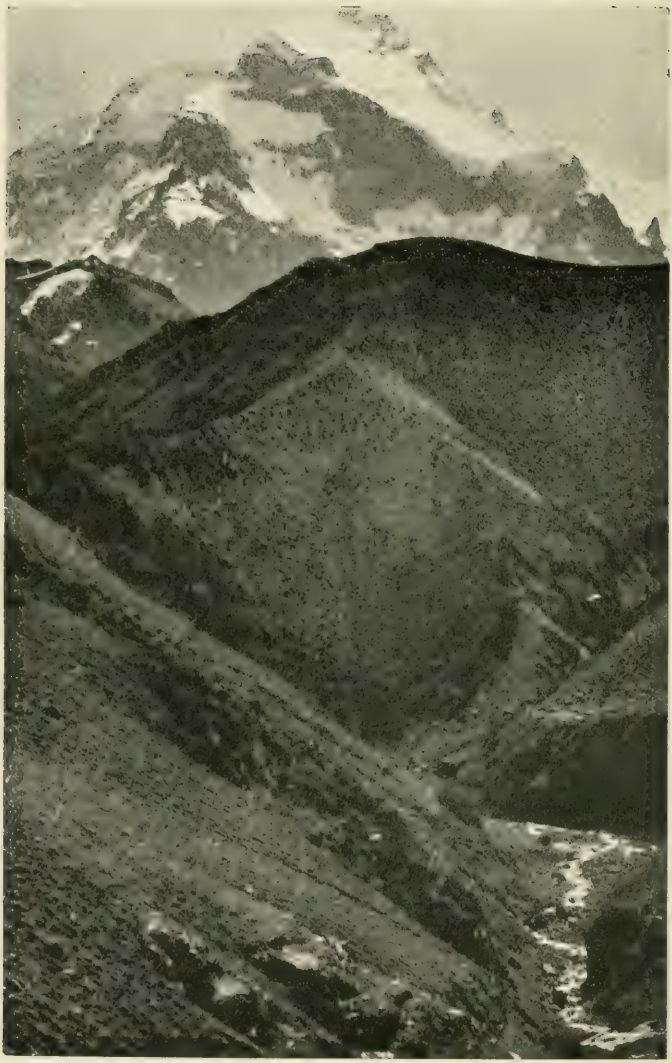
Beyond the transverse *Sierra de Doña Ana*, which terminates near the coast in the *Pajonal* group (6720 feet), the main range is again crossed by the still lower *Azufre Pass* (11,970 feet) at a point where it approaches within 60 or 70 miles of the Pacific. But south of this break the whole system, here deflected to south by east, receives its greatest lateral and vertical expansion between the parallels of 31° and 34° S. in the provinces of Valparaiso and Santiago. Here are developed several elevated lateral ridges which occupy a considerable space both in Central Chile and in the neighbouring Argentine provinces of San Juan and Mendoza, and are surmounted by some of the loftiest peaks and cones in the New World. Such are the *Cerro del Mercedario*, which has not yet been ascended, but has an estimated height of 22,320 feet; *Aconcagua* (23,080), and *Tupungato* (22,000), both of which were for the first time scaled by Mr. S. M. Vines of the FitzGerald expedition in 1897.

These giants are long-extinct volcanoes, although now showing no trace of their terminal craters, which stood one or more thousand feet above the present summits. By his ascent of Aconcagua, which lies about midway between its two rivals—40 or 50 miles south of Mercedario and north-west of Tupungato, 70 north-east of Santiago and nearly 100 from the Pacific—Mr. Vines may claim to have reached the greatest height yet

attained by any climber in the New World. At such an altitude protracted existence is impossible, and even 4000 feet lower down the explorers suffered intensely from the exhausting effects of the *puna*, as the *saroche* or "mountain sickness" is locally called. "I remember," says Mr. Vines, "the first morning after my arrival at this high camp [19,000 feet], Mr. FitzGerald set to work to do the cooking, which consisted of making some coffee—we did not want anything more. He told me to go and get the water for the coffee; this consisted of taking a biscuit-tin and filling it with snow and ice, exactly 10 yards distant from where I stood, near the fire. The guy-ropes of the tent stood in my way. I stepped over one of them with one foot and waited, and then I dragged the other leg after the first, and so on, until I reached the spot. I was ten minutes gone, and when I got back I had just enough snow and ice to wet the bottom of the kettle."[1]

Aconcagua, formerly assumed to stand in or on the border of Chile, is now included in Argentina, in accordance with the latest agreements between the Argentine and Chilean Commissioners, F. P. Moreno and Barras Arana. Mr. FitzGerald, who approached it from the east (Mendoza) side, describes the High Andes as here running north and south in three great parallel ranges. But there are only two, the *Tigre* in the east, and in the west the chain of the water-parting, to which Aconcagua belongs, but which lies some four miles farther west. Aconcagua is thus shown to stand well within the Argentine frontier. Although visible on a clear day from the Pacific, it sends the whole of its drainage in the direction of the Atlantic, some 700 miles away, so that from the hydrographic standpoint

[1] *R. Geogr. Jour.*, November 1898, p. 487.



ACONCAGUA.

the "monarch of the Andes" clearly forms part of the Argentine republic. From its summit a superb view is commanded of Mercedario, away to the north, and southwards of the main range as far as Tupungato, with the intervening *Juncal* (20,500 feet), *Navarro* (19,500 feet) and *Pollera* (19,000 feet), peaks and glaciers clearly marking the boundary line between the two States.

A few miles north of Aconcagua the main range is crossed by the *Los Patos Pass* (11,700 feet), which is associated with perhaps the most memorable event in the War of Independence. Although little used because of its extremely rugged character, it was surmounted in 1817 by the Argentine General San Martin, who was thus enabled to surprise the royalists awaiting him at the *Cumbre* or *Uspallata* Pass, some miles farther south. "He took five thousand men, with artillery, material for making bridges, and provisions, safely across that pass, fought the battle of *Chacabuco* within three days afterwards, and entered the capital of Chile within five days,"[1] —an exploit comparable to the passage of the Alps by Hannibal.

The above-mentioned Cumbre, which lies about midway between Aconcagua and Juncal, is destined to become as famous in the future as Los Patos has been in the past. Falling to 11,512 feet above sea-level, and presenting less difficulties than any other depression in this section of the main range, it has been chosen as the most suitable point through which to carry the now nearly completed Argento-Chilean trans-continental railway. On the east side the line has already penetrated beyond Mendoza to *Punta de las Vacas*, 7858 feet above the sea, while the Chilean section has advanced from *Salto del Soldado* by *Los Andes* nearly to the

[1] Sir C. Markham, *Geogr. Jour.*, November 1898, p. 493.

summit of the Cordillera on the west or Chilean side. Although the short gap between the two terminal stations (6650 ft. high) naturally presents the most formidable difficulties, including a tunnel $1\frac{1}{3}$ mile under the Cumbre Pass, hopes are entertained that this trans-Andean line will be finished in 1910.

At Tupungato the Andean system contracts to about 15 miles on the Argentine side, but still maintains a considerable breadth in Chile, where range after range of lofty lateral ridges occupy the whole space of 45 miles between Santiago and the frontier. On the maps these parallel ridges are not figured, and in fact a vast amount of topographical work has still to be done before cartographists will be able to give an approximately correct picture of the Chilean Andes. "Hundreds and hundreds of miles of these mountains are unknown. Many lofty peaks, said to be over 20,000 feet in height, have never been measured; they have never been visited, have never been approached by any one who was capable of describing them."[1] From Tupungato the FitzGerald party sighted a great burning mountain, of which nothing was known till quite recently. "On arriving at the top of the ridge a volcano was seen about 20 miles to the south-west in great activity. . . . It had the appearance of a great ridge, about 13,000 feet in height, running towards the north, when its height gradually dwindled. A great fissure appeared in the middle of this ridge, from which the smoke poured forth in dark brown volumes," with a "strong, sulphurous, burning smell."[2] This is the *Mount Bravard* of the Argento-Chilean surveyors, who have so named it in memory of the French geologist who lost his life during the earthquake of Mendoza in 1861. But they speak of it, not as a

[1] Sir C. Markham, *loc. cit.* p. 493. [2] *Ib.* p. 484.

very active, but rather as "a nearly extinct volcano" (Moreno).

The Southern Andes—Igneous and Glacial Phenomena

South of Tupungato the system still maintains a great elevation, and here follows a succession of volcanoes,

MOUNT TRONADOR.

mostly extinct or long quiescent, such as *San Jose de Maipu* (17,644 feet); *San Fernando*; *Tinguiririca* (14,700); *Peteroa* (11,925), reported to have shown signs of life in 1762 and again in 1837; *Descabezado* (12,760); *Las Yeguas* (11,350); *Campanario* (11,000), and *Nevado de Longavi* (10,520), all apparently extinct.

Then follow the *Nevado de Chillan* (10,000), *Antuco* (9000), *Villarica* (9320), and *Osorno* (7500), all of which still occasionally emit vapours, while the four-peaked Chillan was in a state of constant eruption during the years 1861-65, and Villarica ejected flames to a height of 4000 ft. in November 1908. But the *Tronador*, or "Thunderer" (9790), near the southern extremity of Chile proper, is so named, not from its underground disturbances, but from the avalanches continually crashing down its slopes.

It would thus appear that throughout the whole of the Chilean system igneous activity is dying out, while glacial phenomena persist, or even show symptoms of further expansion. Many of the cones have lost their terminal craters, or else these vents have become choked with frozen masses. Extensive glaciers descend the flanks not only of the giants in the lower northern latitudes, but also of the smaller groups in the extreme south, where less elevation is compensated by higher latitude and by a greater abundance of atmospheric moisture, everywhere a necessary condition of glaciation. The flanks of the Nevado de Chillan are furrowed by several frozen streams, which have never melted even during the fiercest igneous explosions, and Güssfeld, one of the great pioneers of Chilean exploration, discovered in the far south a wonderful glacier descending down to the region of arable lands. At present the head of the stream to which it gives rise stands 6260 feet above sea-level: but towards the middle of the nineteenth century it reached as low as 5840 feet, so that the glacier has retreated 420 feet in fifty years. But in the Patagonian region some of the frozen rivers still descend, as in Greenland, to the level of the sea, and show no indications of shrinkage.

The Chilean Archipelagoes

The long chain of southern archipelagoes begins about 42° S. lat. with the large island of *Chiloe*, whose very name—*Chile hue*, "Part of Chile"—shows that it was regarded even by the natives as a continuation of the mainland. It is in fact nothing more than a detached section of the coast range running at a mean height of about 2000 feet for 80 miles in the direction of the south. As in the neighbouring province of Valdivia, the steeper escarpments face seawards, while the land slopes gently eastwards to the gulfs of *Ancud* and of *Corcovado*, which are themselves to be regarded as a now submerged southern prolongation of the great central plain of Chile.

These island-studded inland waters, flowing between the great Andes and the archipelagoes, that is, the fragmentary coast range, are continued all the way to Fuegia, without any interruption except at the narrow neck of the *Taytao Peninsula*, which geologically represents a short section of the coast range still connected with the mainland. Between Chiloe and Taytao lies the extensive *Chonos* Archipelago, which comprises over a thousand islands, rocks, and reefs separated from the Patagonian mainland by the narrow *Moraleda Channel*. The southern extremity of this channel is separated from the *San Estevan* inlet of the Gulf of Peñas by the *isthmus* of *Ofqui* connecting Taytao with the coast of Patagonia. Here rises *Mount San Valentin*, which sends down two glacial streams, one south to the San Estevan inlet, the other west to Lake San Rafael, which communicates through the *Rio de los Tempanos* northwards with the Moraleda Channel. On reaching the lake the western glacier glides along the bottom at a depth of nearly 700 feet, and is then broken into fragments by the upward

thrust caused by the greater density of the lacustrine waters. Thus is kept up a perpetual thunder, echoed from cliff to cliff of the encircling hills, while the liberated *tempanos* ("icebergs") drift away to the Moraleda Channel.

Interrupted by the spacious *Gulf of Penas*, which penetrates through a number of fjord-like formations, such as *Jesuit Sound*, the *Boca de Canales*, the *Aropazado Channel*, and the *Calen Inlet*, far into the recesses of the main Cordillera, the insular chain is continued farther on to the Strait of Magellan by the three large islands of *Wellington*, *Hanover*, and *Queen Adelaide*, each fringed by countless clusters of smaller groups. In these southern latitudes the terminology is mainly English, the first serious hydrographic surveys having been carried out by the British Admiralty during the early decades of the nineteenth century. Associated with the work are the names of King and Fitzroy, who were accompanied by the great naturalist Charles Darwin, and conducted the memorable expedition of ten years (1826-36), during which they completed the first systematic survey of the Magellanic lands from Fuegia to Chiloe.

Wellington, about 40 miles south of the Taytao Peninsula, still remains the largest of all the islands north of Fuegia, although considerably reduced in size by the later surveys of Serrano and the German *Albatross* expedition. Several tracts on the west side were found to be distinct groups separated from the main island by the *Fallos Channel* and other navigable waters. On the east side flows the winding *Messier Channel*, which, at the *English Narrows*, contracts to a width of less than 400 feet, and in some places rushes with the speed of a mill-race between high beetling cliffs. But, like all these inland passages, the channel is very deep, and presents a

navigable waterway 150 miles long between Wellington and the rugged shores of Patagonia.

Here the mainland offers a constantly varying prospect, "indented by numerous caves and several deep narrow sounds running far into the recesses of the Cordillera. In the intermediate channel crowds of islets, some rising to the size of mountains, some mere rocks peeping above the water, present an endless variety of form and outline. But what gives to the scenery a unique character is the wealth of vegetation that adorns this seemingly inclement region. From the water's edge to a height estimated at 1400 feet the rugged slopes were covered with an unbroken mantle of green trees and shrubs. Above that height the bare declivities were clothed with snow, mottled at first by projecting rocks, but evidently lying deep upon the higher ridges. I can find no language to give any impression of the marvellous variety of the scenes that followed in quick succession against the bright blue background of a cloudless sky, and lit up by a northern sun that illumined each new prospect as we advanced. At times one might have fancied one's self on a great river in the interior of a continent, while a few minutes later, in the openings between the islands, the eye could range over miles of water to the mysterious recesses of the Cordillera, with occasional glimpses of snowy peaks at least twice the height of the summits near at hand." [1]

Magellan Strait—Tierra del Fuego

South of Queen Adelaide Island, which presents the same general aspect as the other Magellanic lands, the conspicuous headland of *Cape Pillar,* at the northern extremity of *Desolation Island,* marks the western

[1] J. Ball, *op. cit.* p. 222.

entrance of Magellan Strait. This famous inter-oceanic passage, by which Fuegia is entirely severed from the mainland, consists of two nearly equal branches disposed respectively in the direction from north-west to south-east and from north-east to south-west, with a total length of 340 miles. The junction takes place about midway between the Pacific and Atlantic Oceans, at the

GLACIER BAY, STRAITS OF MAGELLAN.

Cape Froward headland of the *Brunswick Peninsula*, which is the southernmost point of the American Continent.

At first sight the Archipelago of *Tierra del Fuego* [1]

[1] After long search had failed to discover any clear indications of "fire," it was asked why Magellan should have called this region the "Land of Fire." It was not, however, named by him *Tierra del Fuego*, but *Tierra de Humos*, "Land of Smoke," and the change is said to have been made by Charles V., with the remark that "there is no smoke without fire." The "smokes," certainly seen by the great navigator curling up on the plains, are supposed to have risen from bonfires kindled by the natives to signal the portent of strange beings approaching in great ships.

seems to present a chaos of insular masses, disposed without order or system. But a closer inspection shows that it comprises two distinct secondary groups—one, on the Pacific side, representing the south-eastern continuation of the Chilean Coast Range, the other, on the Atlantic side, representing a southern continuation of the whole of the mainland, that is, both the Great Andes and the Patagonian plains. Between the two groups flows *Beagle Channel*, which, with its western extension, *Darwin Sound*, penetrates through several passages round *Londonderry*, *Stewart*, and some smaller islands to the Pacific, but is cut off from the Magellanic waters by the *Brecknock Peninsula*. This peninsula, although forming continuous land with the Atlantic section, belongs geologically to the Pacific group, and falls into line with the outer chain of islands which stretch from Cape Pillar for over 400 miles round to Cape Horn. In this respect Brecknock should be compared with Taytao farther north, both being survivals from a time when all the insular groups from Chiloe to Staten Island formed part of the Southern Continent.

But the separation must have taken place at a very remote period, and the different characters of the Patagonian and Fuegian faunas and floras clearly show that Magellan Strait is of great age. The observations made by the Nordenskjöld expeditions of 1895-97 make it evident that the discrepancies in these respects are much greater than had hitherto been supposed. Many animal forms — reptiles, frogs, and numerous invertebrates — occurring on the mainland are unknown in Fuegia, and the "plant-forms of different families exhibit the same sharp demarcation"[1] between the two zones. The Strait, however, does not form a complete parting-line, for

[1] *Geogr. Jour.*, April 1898, p. 437.

many eastern Patagonian forms occur also in Fuegia, and although neither the puma nor the rhea has crossed the channel a small lizard has been found as far south as Rio Grande (53° 50′ S.), the most southerly spot where reptiles have yet been discovered.

Southwards the Pacific section of Fuegia, comprising the relatively large islands of *Gordon, Hoste, Navarin,* and *Wollaston,* besides several small clusters, forms an irregular triangle with its base resting on Beagle Channel and its apex terminating at *Cape Horn,* southernmost point of the New World (60° S. lat.). North of the Brecknock Peninsula the Pacific section is completed by the dreary region which was aptly named *Desolation Land* by Captain Cook, and was long supposed to form a continuous mass extending from Cape Pillar to *Cockburn Channel.* But later surveys have decomposed it into at least three distinct islands, and possibly more may yet be discovered, all separated by very narrow but deep channels, which flow between the Pacific and the western branch of Magellan Strait. The northern member of the group retains the name of Desolation, and this is followed by *Santa Inez,* a name which, pending further exploration, covers everything between Desolation and Clarence Islands. When Mr. Ball passed through he was shown one of the narrow sounds "which have lately been ascertained to penetrate entirely through what used to be considered a single island."[1]

King Charles South Land

Although comprising only four distinct islands—*King Charles South Land, Dawson, Clarence,* and *Staten*—Eastern Fuegia, as the Atlantic section is often called,

[1] *Geogr. Jour.*, April 1898, p. 141.

greatly exceeds the Pacific section in extent. In fact the first-mentioned island, which occupies the whole of the Atlantic side and extends right across the archipelago from *Cape S. Diego* to the Brecknock Peninsula, is alone very much larger than all the other islands taken together. Its former connection with the mainland is clearly shown by a study of its contour lines, which on the east follow the concave curvature of the Patagonian seaboard, and on the west continue the convex trend of the Great Andes round to the *Three Brothers* at Cape S. Diego, over against Staten Island, at the south-east extremity of the Andean system.

Corresponding in its physical aspect with the general character of the mainland, King Charles South Land presents on the Atlantic side the same dreary steppe-like formation as Eastern Patagonia, and on the south and west sides the same rugged mountainous appearance as the Great Cordillera. Here the Andean system is clearly continued along the northern margin of Beagle Channel by the *Darwin range*, above which rise several peaks nearly if not quite 7000 feet high. Such are, going eastwards, the twin-peaked *Sarmiento* (6910 feet), *Mount Darwin* (6800), and *Mount Français* (7000 ?), near the Argentine frontier, beyond which the highest summits are *Mount Cornu* (4335) and the *Three Brothers* (1640), at the south-eastern extremity of King Charles South Land.

Sarmiento, the "Matterhorn of the Fuegian Alps," impresses the imagination with awe and wonder more profoundly than many far more elevated heights. Seen especially from the great bend of Magellan Strait, it produces an extremely imposing effect, its steep slopes and two jagged peaks filling the background at the head of the spacious sound flowing between Clarence and

Dawson Islands, and towering above the snowy crests which flank both sides of the channel. Although igneous formations abound in this southern section of the Patagonian Andes, Sarmiento itself does not appear to be of volcanic origin. "No volcanic rocks elsewhere in the world can retain slopes so nearly approaching to the vertical. It is, I believe, a portion of the original rock skeleton that formed the axis of the Andean chain during the long ages that preceded the great volcanic outbursts that have covered over the framework of the western side of South America."[1]

King Charles South Land is divided by Dr. O. Nordenskjöld of the Swedish expedition into three distinct zones: (1) the just described southern highlands, forest-clad on their lower slopes; (2) the more level central region, where the tops of the hills are alone covered with timber; and (3) the northern treeless zone. The two northern zones are of Tertiary formation, covered with Quaternary deposits identical with the ground moraine of the old glacial region of North Europe.

Besides the groups of islands several peninsular formations, such as *King William Land, Croker* and *Brunswick Peninsulas,* are also regarded as forming part of the Fuegian Archipelago. All these Magellanic lands, projecting from the Patagonian mainland southwards and dividing the strait into an eastern and a western branch, belong to the same geological formations as the neighbouring islands, and are nearly severed from the Continent by deep inlets, such as *Otway Water, Skyring Water,* and *Obstruction Sound.* These waters were surveyed by the Swedish Magellanic expedition of 1907-1909, when Captain Gajardo discovered the narrow channel which now bears his name and connects Skyring with Otway

[1] J. Ball, *op. cit.* p. 245.

and the Xaultegua Gulf; a discovery of very great importance. Gajardo, Obstruction Sound, and Fitzroy are the only passages connecting the surrounding inlets, which are in the nature of fjords, where the tide runs over 8 miles an hour and forms tremendous rapids round the rocks and boulders. This part of Fuegia belongs politically to Chile, which has established the centre of administration at *Punta Arenas* (*Sandy Point*), near the neck of Brunswick Peninsula, on the north side of Magellan Strait. This site has been chosen chiefly on account of the coal-fields which have been discovered in the district, and which afford proof that the Antarctic, like the Arctic regions, enjoyed a warm climate in the Carboniferous epoch. Later came the glacial period, at the close of which Fuegia stood some 200 feet lower than at present; but the subsequent upheaval seems now to have ceased.

Mas a Fuera—Juan Fernandez

To insular Chile also belong the already mentioned Oceanic islets of *San Felix* and *San Ambrosio, Mas a Fuera* and *Juan Fernandez,* as well as the more remote *Sala-y-Gomez* and *Easter Island,* fully described in another volume of the present series.[1] San Ambrosio, culminating with a peak 830 feet high, forms with San Felix and a few scattered reefs a rocky archipelago 370 miles west of Concepcion on the coast of Chile. The group is uninhabited, and yields nothing but a little guano deposited by seals; but one of the rocks, 175 feet high, is well known to English mariners, who have named it *Peterborough Cathedral* from the curious resemblance it bears to the façade of that edifice. The group was first

[1] *Australasia*, vol. ii. p. 528 *sq.*

sighted in 1574 by Juan Fernandez, who in the same year also discovered the much larger and more southern archipelago which perpetuates his name. This group, which faces the Gulf of Corcovado at a distance of about 350 miles, comprises the two islands of *Mas a Tierra*, "Landward," and *Mas a Fuera*, "Outward,"—that is, seaward, nearly 100 miles farther west, with the islet of *Santa Clara* more to the south.

Though not the largest, Mas a Fuera is by far the highest member of the group, rising over 6000 feet above the surrounding waters. But Mas a Tierra (3225 feet), also specially called *Juan Fernandez*, is better known to fame, thanks to its association with De Foe's *Robinson Crusoe*. This was the island where Alexander Selkirk led the solitary life described by himself. The incident is now commemorated by a monument here erected by the officers of the *Challenger* in 1875, when she visited the spot on her cruise round the world. The group is often visited by whalers and other vessels calling for supplies, which are obtained from the inhabitants, chiefly German colonists settled here in 1868. The Archipelago has a total area of about 80 square miles—Mas a Tierra, 38; Mas a Fuera, 34; Santa Clara, 8.

Hydrography—The Chilean Coast-Streams

Since the acquisition of the Atacama territory and neighbouring districts, a considerable section of North Chile comes within the rainless zone, and here the coast-streams present the same wady-like aspect as in Peru. On the other hand, recent exploration has added greatly to the number of perennial water-courses and glacial streams which find their way to the Pacific in Southern Chile and Patagonia. Such is the *Corcovado*, which was

discovered by the Krüger and Rethwich expedition of 1898, and flows from two glaciers near the coast to the gulf of like name about 43° S. lat. It expands to a width of 300 yards in its lower reaches, but higher up is a mountain torrent subject to sudden freshets, and obstructed by shoals and rapids. Such also are the large *Rio Las Heras*, which flows to the Calen Inlet, and was discovered by Moreno in 1897; the *Trinidad* and others partly surveyed by the Argentine ship *Golondrina* in 1897; the *Telcho* and *Palena*, both larger and north of the already known *Aysen* and *Huemules*; the *Puelo*, *Bodadahue*, and *Cisne*, also north of the Aysen. The Corcovado and the Bodadahue are entirely comprised within the Chilean province of Llanquihue. But the Palena, Cisne, Aysen, Las Heras, and others, have their sources in the transversal depression of the Tertiary tableland of Patagonia, and consequently belong neither geologically nor topographically to the Andean system, which in fact is pierced by them on their seaward course to the Pacific. But the great majority of the Chilean rivers farther north rise on the western slopes, and in the central provinces acquire a considerable development by pursuing a winding course over the great plain before forcing their way in deep rocky gorges through the Coast Range to the Pacific. All thus presenting much the same general character, the special features of each may be conveniently tabulated as under [1]:—

River.	Province.	Basin, sq. miles.	Length, miles.	Discharge in cubic feet per second.
Bueno	Valdivia	7200	150	18,000
Biobio	Concepcion	7150	220	16,000
Valdivia	Valdivia	6000	82	13,250

[1] From this table are necessarily excluded most of the more recently discovered southern rivers, detailed accounts of which are still awaited.

River	Province.	Basin, sq. miles.	Length, miles.	Discharge in cubic feet per second.
Aysen	Patagonia	6000 (?)	150 (?)	10,000 (?)
Maule	Maule	8000	140	10,000
Rapel	Colchagua	6600	134	9,220
Huemules	Patagonia	3000	100	9,000
Maullin	Llanquihue	1400	110	9,000
Itata	Nuble	4400	108	6,350
Corcovado	Patagonia	1500 (?)	80 (?)	6,250 (?)
Cauten (Imperial)	Arauco	5000	200	6,200
Tolten	Valdivia	2100	134	3,520
Mataquito	Talca	2700	170	3,500
Maipo	Santiago	5250	155	960
Aconcagua	Valparaiso	3560	160	360
Chuapa	Aconcagua	3800	100	180
Limari	Coquimbo	2600	100	110
Coquimbo	Coquimbo	3500	90	70
Huasco	Atacama	4200	134	70
Copiapo	Atacama	4300	155	60 (?)

Lakes

Formerly the whole of Chile appears to have been strewn with lacustrine basins, traces of which may still be detected even in the now arid Atacama region. But in the northern and central districts nearly all have disappeared, except the *Laguna Negra*, source of the Rio Maipo in the province of Santiago. Farther south the *Gualletue* lakelet in Arauco is followed by a continuous chain of flooded basins, which are disposed along the western foot of the Great Andes in the two southern provinces of Valdivia and Llanquihue. Like the rivers, of which they are feeders, these lakes generally increase in volume southwards, while their great depth and position under the slopes of the Cordillera show that they owe their origin to the grinding action of the great glaciers which, during the Ice Age, advanced into the

central plain much farther than at present. Such are, in their order from north to south, *Villarica, Calaiquen,* and *Huanchue,* which communicate with each other and drain to the Rio Tolten; *Ranco, Payehue,* and *Rupanco,* sources of various head-streams of the Rio Bueno, which has the largest drainage area and is the most copious river in Chile; lastly *Llanquihue,* largest of all these lacustrine basins, and source of Rio Maullin, which, relatively to the small extent of its catchment basin (only 1400 square miles), has the largest volume of all these coast-streams (9000 cubic feet per second). Although few systematic soundings have yet been carried out, all the Chilean lakes are known to be extremely deep—Laguna Negra 900 feet, and Llanquihue 360 close to its rocky shores.

Climate

Although, excluding the newly annexed northern districts, Chile lies entirely within the temperate zone, its climate is everywhere profoundly modified by the local conditions. The chief determining factors are the general disposition of the land, disposed in the direction of the meridian, and stretching across thirty degrees of latitude; the great central plain, confined between lofty mountain ranges which largely control the direction of the atmospheric movements; and the vast development of a seaboard, washed along its entire length by cool Antarctic currents.

In general the temperature falls steadily while the moisture increases southwards, so that a gradual transition takes place from the great heats and absolute aridity of the northern lowland districts to the Arctic winters and superabundant precipitation of the Magellanic lands. Thus are explained the striking contrasts presented by

the Northern Andes, towering to heights of 18,000 or 20,000 feet, but forming relatively few glaciers and often largely free from snow, owing to the lack of humidity, and the Patagonian Cordillera falling below 12,000 feet, but wrapped in a perennial snowy mantle, thanks to the excessive moisture of a region where on the uplands the precipitation takes the form of snow, and on the lowlands the yearly rainfall exceeds 100 inches.

The same contrasts are presented by the coast-streams, such as the Copiapo of the Atacama desert and the Patagonian Huemules, the former with a basin over 4000 square miles in extent, but for a great part of the year sending not a drop of water to the Pacific, the latter rolling down a continuous volume estimated at 9000 cubic feet per second, collected in a drainage area not exceeding 3000 square miles.

Between these extremes lies Chile proper, which both on the coast and in the interior is favoured with one of the healthiest and most delightful climates in the world. Here are naturally situated the great centres of population, Santiago and Valparaiso, and the provinces named from them, together with the conterminous districts, are pre-eminently suited for permanent settlement by colonists from the temperate European lands. It is to this central region that are applicable those glowing descriptions which often cause such surprise to travellers visiting many less favoured districts. The descriptions, however, are perhaps a little overdrawn, as so often occurs in the case of abrupt transitions from dreary arid wastes to more cheerful verdant prospects. Even these central provinces suffer at times from protracted droughts, and indeed from a general deficiency of moisture, the mean annual rainfall being much less than is commonly

supposed, and nowhere rising to 20 inches in any of the districts north of the Maule basin (35°-36° S. lat.), as shown in the subjoined table of temperatures and humidity :—

	S. Lat.	Mean temp.	Summer temp.	Winter temp.	Rainfall in inches.
Iquique . .	20° 23′	66°	75°	59°	0·5
Coquimbo .	29° 56′	59°	65°	53°	1·6
Valparaiso .	33°	57·6°	63°	52·5°	13·5
Santiago . .	33° 27′	55·6°	66°	45°	14·5
Talca . .	35° 36′	56·5°	70°	45°	19·7
Valdivia . .	39° 49′	52·9°	61·5°	45°	115
Ancud (Chiloe) .	41° 46′	50·7°	56·5°	45·9°	134
Punta Arenas .	53° 10′	43°	51°	34° 9°	22·5

In this table is clearly seen the influence of the cold southern marine and aërial currents in lowering the summer heats on the west side of the continent. "While the winter temperatures are not very different from those of places similarly situated on the west side of Europe and North Africa, those of summer are lower by 8° or 10° Fahr., and the mean of the year is lower by 6° or 7° than that of places in the same latitude on the east side of South America. It is also apparent that much of what has been stated in works of authority as to the climate of this region is altogether incorrect."[1]

In the Magellanic lands the winter temperature at sea-level is relatively high, seldom falling much below freezing-point, while that of summer is correspondingly low, seldom rising above 60° Fahr. But in this region great contrasts are presented between the Pacific and Atlantic seaboards, the former being marked by excessive moisture, the latter by a moderate rainfall—20° to 25° inches—and high winds. These gales, which are

[1] Ball, *op. cit.* p. 145. Here it is pointed out that the mean temperature of Santiago given by Grisebach as 67·5° is less than 56°, and the rainfall, stated to be over 40 inches, does not exceed 13·5 inches.

felt as far seawards as the Falkland Islands, are due to the cold atmospheric current rushing down from the western highlands to fill the vacuum caused by the rarefaction of the dry and warmer air on the eastern lowlands. Hence also arise those *williwaws*, or sudden squalls, which sweep down like avalanches from the lateral gorges, and are so much dreaded by seafarers in Magellan Strait and the neighbouring waters.

Flora

Perhaps the most striking feature of the Chilean flora is the large number of absolutely indigenous forms, showing that for long ages the Atacama desert in the north and the Great Andes in the east have largely acted as botanical divides between this region and the rest of the Continent. So destitute of vegetation are the arid northern districts, that for 600 miles between Arica and Copiapo the all-pervading hue of the landscape is a dull monotonous gray, scarcely anywhere relieved by a single patch of verdure. There are doubtless indications that parts of this region were formerly less arid than at present. But this appears to have been largely due to the development of irrigation works under the Incas, and the whole region must have long formed as effective a barrier against the migration of species as the Cordillera itself.

Amongst the numerous local forms are the *Skytanthus*, a dwarfish shrub with yellow flowers, like those of the jessamine, but with no allies elsewhere except two very different species in tropical Brazil; several varieties of the cactus family, ranging as far south as Santiago, a proof that, as above seen, this district enjoys a drier climate than is currently assumed. Peculiar to the same

region are the highly characteristic *Vivianeæ* and *Francoaceæ*, which are by many botanists regarded as distinct natural orders elsewhere quite unknown. Of the *Francoaceæ*, stemless herbaceous growths yielding a black dye and a drug with sedative properties, as many as two genera and five species have been enumerated, all exclusively from Chile. The *Vivianeæ*, also herbaceous or undershrubs, are still more numerous, comprising four genera and fifteen species, some of which appear to have wandered into South Brazil from their Chilean home. Altogether, of about two hundred genera belonging to the temperate zone of South America, the great majority are confined exclusively to this remarkable botanic kingdom of Central Chile, and amongst them are several groups, which show only a very remote affinity with the corresponding forms of other southern regions. The inference seems obvious that an isolated vegetable world was independently developed on the south-west Pacific seaboard at a time when a great inland sea still flowed between the eastern and western sections of the Continent.

It is in the Coquimbo district that the peculiar Chilean types begin to make their appearance, and they would seem to range thence southwards no farther than the Biobio basin (province of Concepcion), so that this local flora, like that of the Cape, was originally confined to somewhat narrow limits—a strip of coastlands stretching across six or eight degrees of latitude, with a mean breadth of about 80 miles. Most of the endemic types have obviously originated on the western slopes of the Andes, whence some modified forms have crept down to the lowlands. "Several of these, as was inevitable, have been found on the eastern flanks of the great range, and it is probable that further exploration will add to the

number. But it is remarkable that as yet so large a proportion should be confined to Chilean territory."[1] Even the flora of the little Juan Fernandez group, now mostly replaced by European intruders, was of an independent character, and more allied to that of New Zealand than of South America. Here was a solitary palm of peculiar type, and it is remarkable that in Chile also only one member of the widely-diffused palm family has been discovered. Yet nearly all the arborescent forms are evergreens, such as the bushy *peumo* (*Cryptocarya peumus*), a species of laurel with edible berries; and the *Quillaja saponaria*, a member of the rosaceous family, highly valued for the cleansing properties of its bark.

A distinctive feature of the Chilean flora is also the extraordinary variety of the species flourishing side by side in the woodlands. Here are nowhere seen continuous stretches of the same trees, as in the European pine or birch groves or in the Patagonian and Fuegian lands, where the forest growths comprise very few distinct forms, besides the widespread Winter's bark and a so-called "oak," which is really a beech (*Fagus drimys*). Many exotics have been successfully introduced from Europe and other parts of the Eastern Hemisphere. For further particulars see Mr. Scott Elliot's paper on the Chilean flora in the *Geographical Journal* for May 1906; and K. Reiche's *Pflanzenverbreitung in Chile* (1907).

Fauna

Except in the class of birds, the Chilean fauna is far less independent than the flora. Even the *huemul* (*Cervus chilensis*), a species of deer figuring in the

[1] Ball, *op. cit.* p. 142.

national arms, is found also in Peru, and is even more abundant in Argentina than in Chile. But the *pudu*, smallest of the deer tribe, appears to be elsewhere unknown. The ape family is unrepresented, and there are no jaguars, venomous snakes, or turtles. Characteristic rodents, although not confined to Chile, are the *chinchilla*

GUANACO.

of the warm northern districts, and the *coypu*, perhaps remotely allied to the beaver, and like it frequenting all the river banks. Both are of some economic value, thanks to their much prized furs, which are largely exported to Europe. Lizards are mainly confined to the hot arid zone, while toads and frogs in considerable variety inhabit all the marshy wooded tracts. The vicuña is seldom met, being mostly replaced by the

allied *guanaco*, which has nowhere been domesticated, but ranges in large herds as far south as Magellan Strait. A large spider, whose bite is much dreaded, appears to be confined to Chile, where it infests the cultivated lands and especially the wheat-fields. There are no turtles, and scarcely any fishes in the lakes and rivers, although the marine waters abound in animal life—a peculiar species of cod, a gigantic crayfish, and enormous banks of mussels, sea-otters, and several varieties of the seal family. Some of these forms range to the Juan Fernandez group, where are met two species of humming-birds, one confined to these islands, the other occurring also on the mainland, together with a third species peculiar to Chile.

Besides the condor and parrots, ranging far to the south, the Chilean avifauna presents an extraordinary number of indigenous forms entirely confined to this region, and no doubt intimately associated with the characteristic leafy evergreen vegetation of all the central districts. Conspicuous amongst the marine birds are the albatross, both the white and the black species; the giant petrel, closely resembling the black albatross; the so-called "cape-pigeon" (*Daption capense*), which has an immense range in the southern hemisphere, and the *Colomba*, with plumage like that of a turtle-dove but nearly as large as the Cape pigeon.

Inhabitants—The Araucanians

In pre-Columbian times the Rio Maule (35° S. lat.) formed the southern boundary of the Peruvian empire, and the ethnical parting-line between its Quichua-Aymara inhabitants and the *Aucaes* or "Rebels," as they called their independent southern neighbours.[1] From Auca

[1] It is no longer possible to determine the racial affinities of the

come the Spanish forms *Aucanes*, *Araucanes*, and their territory, *Araucania*, whence the English term *Araucanians*. Although recognising neither hereditary tribal chiefs nor supreme rulers, and constituting a mere aggregate of family groups without apparent political cohesion of any kind, these "Warriors" already formed in remote times a compact nationality sufficiently organised for all defensive purposes, and strong enough to maintain their independence first against the conquering Incas, and afterwards against the Spanish Conquistadores themselves. Pizarro's associate, Almagro, extended his march in 1535 to the Maule, and he was followed in 1540 by Pedro de Valdivia, who founded Santiago and in the course of ten years fought his way to the Biobio basin, while his lieutenant, Aldarete, even penetrated into Araucania proper. But the heart of the nation remained untouched by these events, and continued for over a century after that time to offer a stout and successful resistance to the invaders, who are said to have lost more men during the fierce struggle than in all their wars of conquest elsewhere in the New World. They had at last to give up the attempt to reduce the stubborn Araucans, and the protracted warfare, commemorated by Alonzo de Ercilla's epic poem, *Araucana*, was brought to a close with the treaties of 1641 and 1655, recognising the autonomy of the Moluche nation within the limits of the present province of Arauco.

This territory, however, which has an area of about 60,000 square miles between Arauco Bay and the Rio Valdivia, has since been encroached upon, not by force

Copayapus, *Coquimbos*, and others who dwelt north of the Rio Maule, and some of whose tribal names survive in the local nomenclature. Most of these aborigines had submitted to the authority of the Incas fully a century before the arrival of the Spaniards, to whom they offered no resistance after the overthrow of the Peruvian empire.

of arms but by a peaceful forward movement, which has left scarcely a nominal independence to the natives, and is gradually absorbing them in the rest of the Chilean population. Interminglings had already taken place through the capture of white or half-caste Spanish women during the border warfare, and the process has since been continued by friendly alliances between the two peoples. The Moluche domain is now nearly divided into two sections by the railways advancing from the coast and from the Andes towards the central plain; all strategical points have long been occupied, and no serious effort has been made to recover a political independence now perhaps less valued than formerly, since the abortive attempt made some years ago to set up a separate "kingdom" under a French adventurer.

From their present peaceful attitude, and their devotion to agriculture, and especially stock-breeding, in which they excel, the Araucanians would appear to have accepted the inevitable, satisfied to exchange a precarious autonomy for the status of free and respected Chilean citizens. The process of assimilation, already completed in the Chiloe and Chonos Archipelagos, must spread on the mainland all the more rapidly, since the so-called tribal groups are nothing more than territorial divisions. Such are the *Picun-che*, or "North-men"; the *Huilliche*, "South-men"; the *Molu-che*, "West-men"; and the *Pehuen-che*, "Pine-men," that is, the people of the central pine-groves, most numerous and powerful of all. On the eastern slopes of the Andes were the *Puel-che*, "East-men," who afterwards ranged down the Rio Negro, and thus came in contact with the Pampas Indians. For the Moluches these Pampeans were also "East-men," whence the confusion between the two groups still prevalent in ethnographic writings. But their radically distinct languages,

all highly polysynthetic, enable us clearly to discriminate between the Araucanian and Pampean Puelches, as well as between both and the Patagonian Tehuelches.

The Fuegians—Yahgans and Alacalufs

A branch of these Patagonians are undoubtedly the *Onas* of East Fuegia, who in remote times crossed the Strait, and found new and congenial homes in the open steppe region of King Charles South Land. The kinship is seen in their physical appearance, tall stature, and many usages, in which respects the Onas differ profoundly from the *Yahgans* and *Alacalufs*, who are the true aborigines of the archipelago.

Both of these groups occupy a low position in the social scale, and while the Alacalufs of the western islands may perhaps be descendants of the Araucanians, who have become debased in their unfavourable environment, the Yahgans of Beagle Channel would appear to be surviving representatives of the primitive populations, who, like the remotely allied Botocudos of Brazil, have remained almost stationary since the Stone Ages.

In recent times some of the Yahgans have been brought under civilising influences by the English missionaries; but those first met by European explorers are described as the most degraded of savages, with no arts, no clothes except undressed skins, no habitations or other shelters against the inclement Austral winters, no permanent family ties, and with mental faculties so little developed that their intelligence has been compared with the stationary instincts of animals. From the vast size and the contents of the kitchen-middens occurring in several parts of the Archipelago, it is evident that the Magellanic lands have been inhabited for incalculable

ages by these aborigines. Yet till quite recent times none of them had progressed to any appreciable extent beyond the extremely rude social condition of their Palæolithic ancestors. The charge of cannibalism, however, which was brought against them by the early observers, is said to be groundless, and their chief food

YAHGAN.

is certainly not their aged or infirm relatives, or even the slain in battle, as has often been asserted, but mussels and other shell-fish, supplemented by the flotsam and jetsam of the surrounding waters. To these resources are added fish and aquatic birds, not, however, by the Yahgans, who have no knowledge of navigation, but by the somewhat more advanced Alacalufs, whose large sea-

worthy skiffs are often met by European vessels plying on the stormy waters of the Archipelago. On these occasions civilisation and savagery come into momentary contact, giving rise to strange scenes, which have been vividly described by Dr. W. H. Russell :—

"A woman with straight black hair, white teeth, and dancing black eyes, naked to the loins, sat in the stern of the frail craft of plank and bark, with a child in her lap, handling a clumsy, ill-shaped paddle; at her feet there crouched a child of some three years old, naked and apparently quite contented, close to the faggots and burning embers placed on the stones which served as ballast. Another woman set on a thwart, and plied her oar with one hand, while she held out the other toward the ship, holding up a couple of otter skins, and asking for largesse, and her appeals were enforced by shrill screams for *bacca! bacca!* from her companions. A man in a white hat, ragged blue frock-coat and trousers, supplied the falsetto to the chorus of the women. The man was of a sickly yellow, the skin of his face puckered and withered like that of a monkey, his arms were thin and muscleless, his eyes dull and unintelligent; the women were darker hued and far more pleasant to look upon. Their arms and limbs were round and well shaped, their shoulders plump and full. In a cutting wind, which made us glad of our warm coats, they sat with their naked children, almost naked themselves, smiling and happy—at least they looked so when the ship opened a fire of biscuits, bread, fruit, old clothes, and some small missiles of tobacco on them. The little ones set to work at once on bananas, and the mother clapped a fancy smoking-cap on the head of the elder. The old garments, which were thrown over to them, were carefully put away, and were not used, for the moment at all events. The savages in

the canoes were all much alike, with little variety save in age, all the women with dazzling teeth, straight hair, and black eyes, rather prominent cheek-bones and square jaws; the younger lusty enough, and better and stronger looking than the men. As long as there were hopes of offers for the poor seal and otter skins and bunches of red berries they held up, or of gifts of bread or other edibles, they hung to the ship, never ceasing to scream *bacca, I say bacca!* and *galieta,* or *biscuito.* 'They are not Christians,' said one of the Chilean passengers; 'nor are they likely to become civilised, less so than ever now since the sheep-farmers shoot them. The latter say they must shoot Fuegians to prevent them stealing their sheep.' The Fuegians might say, 'We did not ask you to come to our country with your sheep, and we can't help stealing sheep when we are hungry.' They will probably die out rapidly now that sheep-farming has come into vogue, just as the Australians and their dingoes did."[1]

The Chileans

Apart from the Araucanians in course of absorption, and the Fuegians in course of extinction, all the inhabitants of Chile have long been merged in a common nationality of Hispano-American descent and of Spanish speech. Their civil wars took place in 1830, 1851, and 1859, but they had a long period of internal peace from 1860 to 1890. In 1891 another very sanguinary civil war was fought, ending in a successful revolution. There has been internal peace since 1892.

Alone among South American Republics Chile has shown a predatory disposition. She has extended her territories at the expense of her neighbours by conquest.

[1] *Op. cit.* pp. 29-31.

The success which has hitherto attended her arms in the invasion of the territory of her neighbours has added an assumption of superiority to the patriotic feeling characteristic of all Hispano-American people.

Besides the Peruvian element, there are several families of English descent in Chile. An English name is borne by a Chilean admiral whose father married a Chilean lady and settled in the country.

The Chilean nationality has also been strengthened by the accession of immigrants, chiefly Germans, whose intention is to settle permanently in the country.

Topography—Railway Enterprise

Apart from the capital, Santiago, and its seaport, Valparaiso, which rank amongst the great cities of the southern continent, large centres of population are not so numerous as might be expected from the generally prosperous state of the country, and especially from the immense development of the mining and allied industries in the northern provinces. But it is to be remembered that these provinces all lie within the rainless zone, which has no attractions except for those connected with the local interests. On the other hand, the Magellanic lands are scarcely inhabitable, while the more favoured central districts are engaged mainly in agricultural pursuits, which are nowhere favourable to the development of large urban groups. From the subjoined table it will be seen that in the whole State there are scarcely a dozen towns with over 10,000 inhabitants, and, it may be added, these places are mostly situated on or near the coast, and owe their prosperity to the steadily increasing foreign trade of the country:—

	Pop. 1905.[1]		Pop. 1905.
Santiago	378,000	Copiapo	9,800
Valparaiso	175,000	Cauquenes	9,000
Concepcion	60,676	Valdivia	8,700
Talca	44,271	San Fernando	8,000
Chillan	31,000	Temuco	8,000
Iquique	43,500	Linares	7,900
Antofagasta	26,445	Angol	7,800
Serena	24,425	Rancagua	7,000
Curico	14,650	Puerto Montt	5,000
Angeles	11,500	Punta Arenas	5,000
San Felipe	11,300	Ancud	4,000
Tacna	9,800	Lebu	3,800

In the arid northern districts, which but for their mineral wealth could never have invited any settlers, the chief places are *Pisagua*, *Iquique*, and *Antofagasta* on the coast, and *Tarapaca* and *Huantajaya* in the interior. Here British influences are everywhere dominant, and to the capitalists, who have developed the nitrate and allied industries, belong the workshops, the warehouses, the railways, the harbour works, the shipping, and the whole trade of the country. The very materials—galvanised iron and shingles—of which the houses of Iquique and Antofagasta are mainly constructed have been imported from England or the States, and put together on the spot. Iquique, the chief centre of this ceaseless movement, possesses the safest roadstead, under the shelter of rocks formerly covered with guano, is now supplied with water by an aqueduct from the neighbouring slopes, and is connected by a network of nearly 300 miles of railways with the *La Noria* nitrate works, with Pisagua and other points on the seaboard.

[1] These populations are those of the towns themselves, and not of the "municipalities," which in most cases comprise large rural districts, and convey an exaggerated idea of the size of the place. Thus Ancud, little more than a good-sized village, has a municipal population of 25,000, and 76,000 are credited to the little town of Rengo, a few miles south of Santiago.

Some ten miles inland, at an altitude of 3000 feet above the sea, are the famous silver-mines of *Huantajaya*, which since their discovery in 1556 have yielded over £70,000,000 of pure metal, but appear to be now nearly exhausted. From Antofagasta on Moreno Bay farther down the coast much silver continues to be exported; but this comes chiefly from Huanchaca and the other Bolivian mines, which are now tapped by the railway connecting the Titicaca basin with the Pacific.

IQUIQUE.

Copiapo, an historical place perpetuating the name of the old Copayapu Indians, was an obscure fishing village till the discovery of the rich argentiferous lodes of *Chanarcillo* in 1832. The railway connecting Copiapo with the port of *Caldera*, 5 miles to the north-west, was opened in 1851, and is consequently the oldest in South America except the Demerara line in British Guiana. Silver occurs even as far south as *Verbabuena*, at the foot of the *Cerro de la Plata* ("Silver Hill"), which is connected by rail with its port of *Carrizal Bajo*. Here the argentiferous ores are replaced by copper, which is found

in abundance in the neighbouring Huasco basin, and beyond it in many parts of the province of Coquimbo.

Serena, the provincial capital, although destitute of a harbour, enjoys the advantage of a sheltered roadstead in Tongoy Bay, enclosed on the south by the sharp headland of Lengua de Vaca ("Cow's Tongue"). This thriving seaport has also become the centre of a network of rail-

COQUIMBO.

ways running up the Elqui valley to *Vicuña*, south to *Ovalle*, and south-west to the ports of *Tongoy* and *Riradavia*. The Ovalle line is eventually to be continued through *Combarbala* and *Illapel* to *Petorca*, where a junction will be effected with the Valparaiso-Santiago system, and thus with the Trans-Andean trunk line now approaching completion.

Valparaiso was so named by its founder, Saavedra,

from his native village in Old Castile. Its prosperity is not due to any natural advantages, for the roadstead is fully exposed to the northern winds, and but partly sheltered from those of the south by a low headland, which has lately been extended by a breakwater. The space between the neighbouring hills and the shore is also so narrow that the city has been developed, not in a horizontal direction, but vertically up the steep slopes of the Coast Range. Seen from the water, it thus presents an almost unique panoramic view, far more picturesque to the eye of the passing observer than convenient for the permanent residents. A high and broad mountain ridge forms a crescent round the open bay, and the flanks of this ridge have been furrowed by numerous *embrados* or deep ravines, both sides of which are lined with houses of all sizes and shapes, imparting a very singular appearance to the city.

Along the shore skirting the bay runs the circular road between the waterside and the overhanging cliffs, and even for this thoroughfare room had to be found partly by filling in the low-lying beach, and partly by blasting away the projecting rocks. The roadway, thus almost literally hewn out of the mountain-side, forms the great artery of Valparaiso, and is skirted by some fine warehouses, banks, government and other public buildings. According to the width of the various ravines in the precipitous escarpments, the lower parts of the city gain more or less easy access to the outlets of the valleys, while the plateau developed on the summit of the Cerro, and now densely covered with houses, is reached by winding paths excavated in the flanks of the encircling ridge.

Foreigners constitute in some respects the most important element of the population. While showing a

VALPARAISO.

greater tendency to become naturalised than is the case in some other parts of South America, they have largely contributed to the rapid commercial prosperity of this great emporium of the New World. "The names over the shops, many of which are large and handsome, are mainly foreign, German being perhaps in a majority; but the important mercantile houses are chiefly English, and, except among the poorer classes, the English language appears to be predominant."[1] Valparaiso was nearly ruined by the devastating earthquake which wasted parts of the Chilean seaboard in 1907.

From Valparaiso to *Santiago* the distance in a straight line is not more than 55 miles. But the railway, which has to surmount the Coast Range by a pass 4310 feet high, makes a great detour of 115 miles up the *Quillota* valley, and then round to the south, in order to reach the capital, which stands on the central plain 1740 feet above sea-level. The great city, which for population is surpassed in South America only by Rio de Janeiro and Buenos Ayres, enjoys an exceptional reputation for its well-paved, broad and clean thoroughfares. Some wealthy owners of mines and large landed proprietors have here erected many sumptuous edifices, rivalling in splendour the palaces of princes. But with these exceptions the architecture of the place has been wisely kept within the limits consistent with economy and comfort, cleanliness and the climatic conditions. Hence most of the houses are built in the old Spanish style, and only one story high, as a precaution against the frequent and at times terrific earthquakes by which the country is visited.

Owing to this circumstance, and to the straggling character of the suburbs, Santiago covers a larger area

[1] J. Ball, *op. cit.* p. 140.

THE MUSEUM, SANTIAGO.

than many places greatly exceeding it in population. But the inconvenience of "magnificent distances" is obviated by the numerous tramways running at very low fares in all directions from one end of the city to the other. The finest view of the place is afforded by the Cerro Santa Lucia, a reddish porphyry crag rising abruptly from the very heart of the city, and laid out with much taste as a public pleasure-ground. It was on the summit of this historical height that the first settlers erected the stronghold, which enabled them to hold out for six years against their implacable Araucanian foes. So closely were they besieged that they were driven to live on the most loathsome food, and the little corn they could grow under the very muzzles of their guns.

The Alameda is one of the finest in Spanish America, forming a triple avenue nearly two miles long and about 100 yards wide, lined with poplars and adorned with fountains and statues of national celebrities. Conspicuous amongst these monuments is the equestrian statue of General O'Higgins, one of the foremost heroes of the war of independence, who, however, banished by his ungrateful countrymen, died in exile.

For the splendour of their picturesque surroundings, few places can compare with the Chilean capital. "Rio de Janeiro, Constantinople, Palermo, Beyrut, Plymouth, all have the added beauty that the sea confers on land scenery; but such a spectacle as is formed by the majestic semicircle of great peaks that curve round Santiago, lit by the varying tints of day and evening, is scarcely to be matched elsewhere in the world. In position, as in plan of building, I was reminded of Turin; but here the Alps are nearly twice as high and at half the distance. Further than that, the low country at Turin opens to the east, and, although glorious sunrise

effects are not seldom visible, they never rival the splendours of the close of day." [1]

Besides the coast-line, Santiago is connected southwards with *Curico* by a railway running for 116 miles through an extremely romantic country, and northwards with the still more romantic region of Mount Aconcagua by that section of the Trans-Andean system which branches off from *Llaillai* on the Valparaiso line, and ascends the valley of the Rio Aconcagua to and beyond *San Felipe* and *Santa Rosa de los Andes*. Here a gap of about 24 miles still remains to be bridged over between the Chilean and the Argentine systems, and another of about 100 miles to effect a junction with the lines advancing from Serena in the direction of Petorca and Santa Rosa. But the Central Chilean system is now completed in the direction of the south by the line running from Curico through the important towns of *Molina*, *Talca*, *Linares*, *Parral*, *San Carlos*, and *Chillan* to *Concepcion* near the coast, with a short branch from *Bulnes* to *Tomé* on *Talcahuano Bay*, and down the east side of this inlet to *Penco*. Here it bifurcates, one branch skirting the south side of the bay to the port and arsenal of *Talcahuano*, while the other rejoins the main line at Concepcion on the right bank of the Biobio estuary.

Founded by Valdivia in 1541, but soon after captured by the Araucanians, and later visited by many calamities —earthquakes, inundations, and renewed attacks of the natives—Concepcion has nevertheless become the "capital of South Chile," and the chief manufacturing centre in the republic. Its prosperity is due partly to the discovery of the rich coalfields which extend for 100 miles through the neighbouring province of Arauco, and partly to its position close to Talcahuano Bay, a spacious inlet

[1] J. Ball, *op. cit.* p. 156.

entirely sheltered from the south-west winds, and forming incomparably the finest natural haven on the coast of Chile. Hence the chief naval station of the republic has been established at this point, and while extensive harbour works have long been in progress on the south side of the bay, the abundance of cheap fuel has fostered the development of metallurgic and other industries at Tomé,

CORONEL.

Penco,—the original site of Concepcion, *Coronel*, *Lota*, and other places on the east side of Arauco Bay.

Strangers arriving for the first time at Coronel are scarcely prepared for the numerous indications of prosperity afforded by this busy little seaport, which stands on a sheltered inlet about midway between Concepcion and *Arauco*, and is the chief centre of the trade and industries of the surrounding district. Factory

chimneys meet the eye in all directions, the harbour is generally crowded with shipping, and Coronel, scarcely known before 1851, "when it was elevated to the dignity of a port, has now its civil governor and its maritime sub-delegate, a hospital and a lazaretto, consular representatives of the Great Powers, telegraphic communication, not merely with Chile and Peru, but with Europe and the world."[1]

The yearly output of the local coal-fields already exceeds 700,000 tons, and copper also abounds in the district. Mining enterprise has been stimulated by the construction of a coast line of railway, which forms a southern extension of the Central Chilean system, and is carried over the Biobio estuary at Concepcion by a magnificent viaduct with sixty-two massive piers, and a total length of 6000 feet, including approaches. The Rio Malleco still farther south is spanned by another great railway bridge 1400 feet long and over 300 feet above the bed of the river.

In the extreme south of the Chilean mainland are *Valdivia*, near the mouth of the Callecalle; *Maullin*, on the navigable estuary of like name, and *Puerto Montt*, at the head of Reloncavi Bay. *Ancud*, at the western entrance of Chacao Channel, on the north side of Chiloe, is the *San Carlos* of the early Spanish settlers. In the flourishing days of Antarctic whale-fishing this place was much frequented by skippers, who here found good anchorage and some protection from the southern winds. Elsewhere in the Archipelagoes and the Magellanic lands there are no important settlements except the already mentioned *Punta Arenas*, the "Sandy Point" of English mariners. Founded in 1851 as an agricultural settlement, and afterwards transformed for a time to a

[1] Russell, *op. cit.* p. 35.

Chilean convict-station, Punta Arenas has since acquired some importance as the headquarters of the Fuegian administration, and an indispensable port of call for all shipping passing through Magellan Strait. The local resources are not inconsiderable, and the settlers believe that bright prospects are secured for the capital of the Magellanic lands by the undoubted presence of gold-bearing reefs and coal-fields in the district, which is also well suited for sheep and cattle farming.

Natural Resources—Agricultural and Mineral Wealth

From the standpoint of its natural resources Chile has been divided into four distinct zones: (1) the purely agricultural region; (2) the agricultural and mineral combined; (3) the exclusively mineral; (4) the forests and fishing-grounds. The first zone comprises the central provinces from Aconcagua to Valdivia, a well-watered and fertile tract, in which husbandry and stock-breeding are fairly well developed. About half of the population is engaged in these pursuits, the chief products being wheat (yearly crop 30 million bushels), other cereals (9 million bushels), wine of good quality (yearly export 70,000 to 80,000 gallons). In the mixed agricultural and mineral zone, comprising the province of Arauco and some neighbouring districts, coal, iron, copper, and brick-clay abound, while stock-breeding is carried on by the Araucanian Indians with great success.

The third or exclusively mineral region includes all the waterless northern districts of Coquimbo, Atacama, Tarapaca, and Antofagasta, partly belonging to Chile proper, partly acquired by conquest from Peru and Bolivia. Here is concentrated a prodigious store of valuable organic and mineral products—nitrates, borax,

iodine, gold, silver, copper, iron, gypsum, cobalt, manganese. The whole province of Atacama is one vast mine. Wherever the trouble has been taken to look for them, treasures of mineral ores or alkalies, valuable as articles of commerce, have been found. The amazing number of mines may be imagined from the fact that in the first district of Caracoles alone upwards of 4000 silver-mines have already been surveyed and assessed. Caracoles, from *caracol*, a snail shell, is so named from the mountains consisting mostly of a rich fossiliferous shelly limestone, which abounds in ammonites. The mineral districts of Northern Chile extend southward by Illapel and Conchali towards Valparaiso. Of copper, which occurs chiefly in Coquimbo, the output exceeded 29,000 tons; of silver, 34,000 lbs.; and of gold, 1660 lbs., in the year 1905.

The nitrate-fields cover an area of 225,000 acres, and are estimated still to contain 20 million tons of the nitrate of commerce. A large amount of British capital is invested in this industry, the annual yield of which rose from 550,000 tons in 1884 to 1,782,000 in 1907. Mineral waters—ferruginous, chloruretted, sulfurous, or charged with carbonic acid—occur especially at Cauquenes in the province of Colchagua, at Chillan in Nuble, and at Colina, Apoquindo, and Tiltil in Santiago. The forest zone, which contains an immense supply of timber, extends from the province of Valdivia southwards to Fuegia. Here arborescent vegetation is favoured by the heavy rainfall, which renders agricultural pursuits unprofitable. The marine waters in the same high latitudes teem with animal life—several kinds of edible fishes, sea-otters, seals, mussels, and other shell-fish.

In the Araucanian stock-breeding districts it is pleasant to see the numerous herds of cattle and horses

grazing on the pasture-lands along all the river valleys. They are tended by the mounted *Huao*, who corresponds to the *Gaucho* of the Argentine pampas, but perhaps takes life somewhat more leisurely. He may often be seen, enveloped in his poncho, amusing himself, like the mediæval sportsmen, with a tame falcon on his wrist, while the real work of looking after the herds is done by a specimen of the fine breed of native wolf-dogs crouching at his feet.

Land Tenure—Emigration

Unfortunately in the strictly agricultural districts there is a dark side to the picture presented by the general prosperity of the people. The conditions of the land tenure have given rise to much political strife, and undoubtedly constitute a source of danger to the social system. There are here no small holdings occupied, as in France, by an independent peasant class, nothing, in fact, but day labourers employed for a mere pittance on the large landed estates. The families of the oligarchy have secured for themselves the possession of the whole land, and the poor wretches hired by them are really worse off than slaves, or than the Russian serfs before their emancipation.

The abject poverty of the labouring classes in Chile can scarcely be paralleled elsewhere in the whole world, and in many districts the evil is intensified, as in Ireland before the potato famine, by over-population. Official returns show that, owing to the prevailing misery no less than 30,000 labourers migrated in one year to Peru, where they found employment on the railway works then in progress. In proportion to its population no country in the world sent forth such a stream of emigrants as Chile did in the seventies or eighties.

According to the carefully prepared returns of the National Society of Agriculture, there is 1 emigrant in Germany for every 200 of the population, 1 to 113 in England, 1 to 2000 in France, but in Chile at that time 1 to every 76! Partly to repair these losses, and partly to develop the general resources of the country, Chile has sought to attract to its shores a share of the stream of European migration, but has naturally received the answer that, if prospects of settlers are so bright in the republic, why cannot the native workmen remain there? In the five years 1901-5 the total number of immigrants, chiefly from Italy and Spain, fell short of 15,000.

Administration

Although the war of independence, begun in 1810, was brought to a successful issue in 1818, the present Constitution dates only from the year 1833. It provides for a legislature vested in the National Congress, consisting of a Senate and a Chamber of Deputies, the former elected for six years in the proportion of one for every three Deputies, and the latter elected for three years in the proportion of one for every 30,000 of the population. The Senators, who must have an income of £400 a year, are returned directly by provinces on the cumulative system of voting, the Deputies, who must have an income of £100, directly by departments, both bodies being chosen by the same electors. The executive is entrusted to a President, elected for five years by delegates nominated by the people. The President, who has a modified veto, but is not re-eligible, is assisted by a Council of State and a Cabinet of Ministers for the interior, foreign affairs, worship and colonisation, justice and public instruction, finance, war and marine, industry and public works.

NORTH CHILE

70°
65°
20°
25°
30°
35°
PACIFIC OCEAN
South Latitude
TROPIC OF CAPRICORN
PERU
BOLIVIA
ARGENTINA
TACNA
ARICA
TARAPACA
ANTOFAGASTA
ATACAMA
COQUIMBO
ACONCAGUA
VALPARAISO
SANTIAGO
MENDOZA
SAN LUAN
LA RIOJA
CATAMARCA
SALTA
JUJUY
TUCUMAN
Salt Pampas
Longitude West 70° of Greenwich
65°
Scale 1:6,336,000 100 English Statute Miles to 1 Inch.
100 50 0 100 200
Railways shown thus
Stanford's Geog.l Estab.t London.
London Edward Stanford, 12, 13, & 14, Long Acre, W.C.

In religious matters complete tolerance is proclaimed by the Constitution, which respects and protects all creeds, while Roman Catholicism is so far privileged that it is maintained by the State. Civil marriage, however, is the only form acknowledged by law.

Education is free at the expense of the State, and in 1905 the public primary schools numbered 2100 with 159,000 pupils. In the same year there were 521 private schools with an attendance of over 31,000. Higher instruction is amply provided for by two Universities and the National Institute of Santiago, several lyceums, provincial colleges, and technical schools. In no other Hispano-American State is so much attention paid to the educational interests of the people. The leading statesmen have proclaimed the development of instruction as the basis of all true progress. Every province has its gymnasium, and the grant for educational purposes exceeded £432,000 in 1907, an enormous sum for a revenue of about £6,850,000.

Although the standing army is limited to about 11,000 men, there is a National Guard, in which all citizens from 20 to 40 years of age are obliged to serve, and which places a land force of 430,000 men at the disposal of the State in case of war. The naval forces, comprising 1 battleship, 6 cruisers, 6 destroyers, and 11 torpedo boats, is strong enough to maintain the supremacy of Chile over all the neighbouring States in the Pacific and Austral waters.

CHAPTER X

ARGENTINA

Boundaries, Areas, Populations—European Immigrants—Physical Features—General Survey—The Argentine and Patagonian Cordilleras—The Cordoba, Ventana, and Tandil Heights—Argentina, Fuegia, and Staten Island—The Pampas—The Patagonian Plateau—Hydrography—The Parana-Uruguay Basin and Delta—The Rios Bermejo and Salado—The Rio Dulce and the Cordoba Affluents—The Lower Parana and the Plate Estuary—The Upper and Lower Colorado Basins—The Patagonian Rivers and Lacustrine Basins—The Magellanic Lakes—Climate—Flora—Scenery of Gran Chaco—Fauna.

Boundaries, Areas, Populations

THE Argentine Republic, or simply Argentina, is the largest and most populous of all the Hispano-American States in the Southern Continent. Here it is exceeded in these respects by Brazil alone, and even if the whole of Latin America be taken into account, it will still hold the second place for extent, being nearly double the size of Mexico, although for population greatly outnumbered by that State. Like Bolivia, Argentina is conterminous with five of the South American republics—Chile along its western and southern borders, where the long pending frontier questions were settled in 1902 (*see* p. 270); Bolivia in the north; Paraguay, Brazil, and Uruguay in the east. As determined by the Convention of 1876,

the boundary towards Paraguay coincides with the Rio Pilcomayo from the Bolivian frontier to its confluence with the Rio Paraguay, then with this river to the Parana confluence, beyond which it ascends the Parana to its junction on the left bank with the Rio I-guazu, where it strikes the Brazilian frontier.

By the Convention of 1890 the line towards Brazil ascends the I-guazu and its San Antonio tributary to its source, from which point it runs in a straight line to the Upper Paperi, and thence down that river southwards to its confluence with the Uruguay. Then the Uruguay forms the boundary towards the republic of Uruguay from 30° S. lat. to the Plate estuary, which separates the two States in such a way as to leave to Argentina the small but strategically important island of Martin Garcia.

Since the settlement of the Chilean frontier question the actual extent of Argentina cannot be accurately determined, and in point of fact the approximate estimates vary from about 1,200,000 to 1,320,000. This vast region, making about one-third of the whole of Europe, formerly constituted a number of autonomous States loosely banded together for general and defensive purposes under the name of *Provincias Unidas del Rio de la Plata.* But since 1853, when the confederacy was joined by Buenos Ayres, these semi-independent States have been merged in a single republic comprising fourteen provinces and ten territories, with areas and populations as under :—

Provinces.	Area in sq. miles.	Population (1905).
Buenos Ayres (Federal District)	72	1,025,653
Buenos Ayres (Province)	117,777	1,392,208
Santa Fé	50,916	690,068

Provinces.	Area in sq. miles.	Pop. (1905).
Entre Rios	28,784	376,600
Corrientes	32,580	304,583
Rioja	34,546	33,441
Catamarca	47,531	104,228
San Juan	33,715	102,569
Mendoza	56,502	165,725
Cordova	62,160	487,435
San Luiz	28,535	99,589
Santiago del Estero	39,764	187,968
Tucuman	8,926	269,617
Salta	62,184	138,419
Jujuy	18,777	56,544
Total Provinces	622,969	5,484,647
Territories.		
Misiones	11,282	39,978
Formosa	41,402	13,431
Chaco	52,741	21,132
Pampa	56,320	56,576
Rio Negro	75,924	23,901
Neuguen	42,345	20,147
Chubut	93,427	10,218
Santa Cruz	109,142	3,992
Tierra del Fuego	8,299	1,163
Los Andes	21,986	2,708
Total	1,135,840	5,678,197

Here it will be noticed that the territories, by which are to be understood the unsettled districts still thinly occupied by the aborigines, comprise nearly two-thirds of the whole State, with a population that may almost be considered a negligible quantity. In fact the natives have almost disappeared from all the provinces, and are reduced to a mere handful—some 30,000 altogether—in the territories. Many of these, especially in Chaco, are unreclaimable savages, who are rapidly dying out, not by absorption, a process which has long ceased to operate, but by absolute extinction. Nor were the aborigines at any time very numerous in a region consisting to a large

extent of open steppe-lands, treeless plateaux, or marshy woodlands, which were quite incapable of supporting numerous populations living in a state of nature. Hence the European settlers have here preserved their racial purity to a greater extent than in most other parts of Latin America.

European Immigrants

Nevertheless, the present inhabitants of Argentina are of a less homogeneous character than those of the other Hispano-American States. In recent years immigrants have flocked in large numbers to this region, not only from the peninsula, but also from the British Isles, Germany, Italy, and other parts of Europe, and these fresh arrivals have not yet had time to merge in a single nationality with the earlier Spanish settlers. In many places they are massed in numerous independent ethnical communities, speaking their own languages, following their own religions, customs, and traditions, and keeping socially aloof from the indigenous Spanish-speaking inhabitants. In 1905 they were reinforced by as many as 177,000 newcomers, and in the period of fifty years ending in 1905 the total number of immigrants exceeded 3,387,000. From the subjoined table of foreign settlers, calculated for the year 1895, it will be seen that the great majority came from the South European countries of Neo-Latin speech, and as these naturally tend to merge more rapidly than others in the Spanish-speaking population, the expectations of certain political economists that the Anglo-Saxons, or at least the Anglo-Teutons, might become the controlling element in Argentina, seem doomed to disappointment:—

Italians	492,636
Spaniards	198,685
French	94,098
British	21,788
Germans	17,143
Swiss	14,789
Austrians	12,803
Portuguese	2,269
Jews and Sundries	32,184
Total	886,395

Physical Features—General Survey

The popular idea that Argentina consists mainly of a boundless level plain, for which the early settlers retained the old Quichua term *pampa,* is probably due to the impression produced on strangers for the first time arriving in the Plate estuary by the uniform aspect of the surrounding lands. But a closer study of the actual relations shows that this view is subject to profound modification. True it is that a great part of the country was formerly flooded by the already described Pampean Sea, and consequently still presents a nearly horizontal surface, with a slight, in some places a scarcely perceptible, incline towards the Atlantic. But the great inland basin was not only contracted, especially in the north-west, by lofty ranges belonging to the Andean system, but was also broken by high mountain masses, which rose at several points above the surrounding waters. Moreover, the primeval uniformity of the marine bed was probably in early Tertiary times disturbed by movements of upheaval arrested at different levels, while the Pampean Sea itself was limited southwards by the Patagonian plateau, which has certainly been dry land also since Tertiary times.

These general features of a former, but still com-

paratively recent, geological age, are necessarily reflected in the present conformation of the land. Hence, although the pampas may be regarded as its most conspicuous feature, they are found to be greatly diversified by Andean highlands in the north-west between the Pilcomayo and Bermejo basins, and farther south in the province of Mendoza and Patagonia, as well as by the isolated Sierra de Cordoba in the centre and the Tandil and Ventana heights between the Plate and Colorado basins.

Further variety is imparted to the whole region by the different elevations now presented by the pampas themselves, which between the Cordoba hills and the Rio Salado form a gently inclined terrace falling from 3000 to about 600 or 700 feet above the sea, and lower down constitute a nearly level plain gradually falling from 250 to 120 feet, and extending round the Plate estuary all the way to the Atlantic. Although largely due to the former upheaval of the bed of the inland sea, these elevations also represent a large amount of detritus, either accumulated in the form of talus at the foot of the hills on the higher grounds, or else carried down and slowly deposited as alluvial matter on the lower grounds by the running waters from the surrounding Brazilian and Andean uplands. Such in broad outline would appear to be the geological framework of the Argentine lands, where are accordingly to be considered the western (Argentine and Patagonian) Cordilleras, the isolated central and southern heights, the steppe-like pampas and the Patagonian tableland.

The Argentine and Patagonian Cordilleras

Although east of the main Andean range, which forms the divide between the Chilean and Argentine

States, there is no continuous parallel mountain chain, the system nevertheless extends at several points to considerable distances eastwards, either in connected or even parallel ridges, or else in separate groups scattered over the plains.

In the extreme north-west the *Cerro de las Granadas* is a conspicuous object close to the Bolivian frontier, and here a distinct line of snowy crests disposed in the direction from north to south maintains a mean altitude of over 11,000 feet. Farther south follow the *Pasto Grande, Acay, Cachi*, and other peaks, which are also snow-clad throughout the year. West of the Jujuy basin the *Nevado de Chañi* and the *Tres Cruces* tower to heights of 18,000 feet and upwards, while the *Zenta* ridge, with summits approaching 17,000 feet, is crossed by the *Zenta Pass* at an altitude of 14,800 feet. The whole of this Alpine region shows clear traces of former glaciation, although at present, owing to the absence of moisture and the tropical heats, the normal snow-line falls little below 17,000 feet.

West of the Tucuman plains, where the Andean system is greatly contracted, a lofty range running for about 30 miles north-east and south-west between the Rio Juramento and the sources of the Rioja takes its name from its culminating peak, *Aconquija*, which was first scaled in 1883 by Rodolfo Hauthal and by him estimated at 17,740 feet. Some 130 miles south-west of Aconquija rises the superb *Nevado de Famatina*, which is connected with the Andean plateau by a ridge parallel to the main axis, and has an estimated height of 20,700 feet.

The Famatina range, which traverses the province of Rioja, is separated from the Great Andes by the so-called *Ante-Cordillera* or *Pre-Cordillera*, a very old

and formerly continuous chain, which is now broken into several detached sections by the erosive action of the head-waters of the Rio Vermejo. Here the connecting plateau, 13,000 to 14,000 feet high, is dominated by several isolated crests, which rise 4000 or 5000 feet above the surrounding puna. Such are the snowy peaks of *Bonete, Salto, Manrique, Totora,* and several other

ACONCAGUA : PASO DE LOS CONTRABANDISTAS.

summits, all exceeding 18,000 feet, and consequently rising well above the snow-line.

Yet this bleak region of the puna, which is exposed to fierce gales and blizzards, is traversed in several directions by the so-called *piricas* or mule-tracks leading over the Great Andes down to the Copiapo valley in the Atacama desert. Farther south the *Cordillera del Tigre*, another section of the same system, penetrates at a height

of over 16,000 feet into the province of Mendoza, where it is connected by lateral ridges with Aconcagua. Here the plateau is crossed by the main route between Buenos Ayres and Santiago, and here is the already described Cumbre Pass, which will soon be pierced by the trans-Continental railway advancing both from the Chilean and the Argentine sides.

Beyond the province of Mendoza, where the Great Andes culminate about the Chilean frontier in Aconcagua and Tupungato (see p. 278), the main axis again contracts, developing a deep curve westwards, while the Argentine and Patagonian offshoots of the Cordillera diminish steadily in altitude southwards. Beyond the *Maypu* volcano, which still rises to a height of over 17,600 feet, the isolated *Nevado de San Rafael* falls to little over 16,000 feet. It is separated by a broad plateau, formerly a large lacustrine basin, from the Malargüe ridge, which is crossed by the *Butaco Pass* at a height of scarcely 5000 feet. But in the transitional region between Argentina proper and Patagonia the Ante-Cordilleras broaden out eastwards, and attain great elevations in some isolated groups, such as the *Cerro Payen* in the Upper Colorado basin, and farther south the *Sierra Auca Mahinda*, rising, according to some estimates, above 16,000 feet.

It is, however, doubtful whether these eastern uplands belong geologically to the Andean system. Some light has been thrown on this point by the explorations of Otto Nordenskjöld in South-Western Patagonia, where the snowy Cordillera, consisting of folded metamorphic schists, is shown to be separated from the dry pampa tableland of Tertiary age by a broad zone of transition, with lofty mountains formed partly of younger contorted slates, partly of horizontal or slightly inclined Tertiary

rocks, eruptive or sedimentary. "These mountains, on the one hand, topographically form a direct continuation of the Cordillera, and on the other are separated by valleys that sometimes form extensive lowlands of a character resembling that of Patagonia, and contain rivers which mostly run to the Pacific. . . . It seems that the isolated mountains, even the actual pampa hills, were once joined to the Central Cordillera. Rivers flowing from this to the east afterwards cut out valleys that were considerably widened by the action of great glaciers extending far outside the mountains."[1]

The Cordoba, Ventana, and Tandil Heights

That the isolated heights which rose above the surface of the Pampean Sea—*Sierra de Cordoba* in the central parts, *Sierras Ventana* and *Tandil* south of the Plate estuary—have no physical connection with the Andean system is evident both from the position of these groups and from their geological constitution. The Cordoba system, prolonged south-westwards in the *Sierra de San Luis*, or *de la Punta*, consists of several parallel ridges traversing the pampas for about 300 miles in the normal direction from north to south at altitudes ranging from 3000 to 5000 feet, and culminating in the *Champaqui* peak of the central ridge (7550 feet). In the San Luis section the highest point is *Tomolasta* (6850 feet), called also *Cerro de las Minas* from its rich gold-bearing quartz reefs. The prevailing gneiss and other crystalline formations are replaced towards the north-west by a ridge of igneous origin, with a chain of extinct volcanoes terminating westwards in the trachytic *Cerro de Yerba Buena* (5400 feet).

[1] *Geogr. Jour.*, October 1897, p. 409.

Granites, gneiss, quartzites, and Archaean rocks of great age also prevail in the Ventana and Tandil chains, which are disposed mainly in the direction from west to east between the Plate and Colorado basins. These very ancient uplands, ages older than the Andean system, have, like the Brazilian highlands, been subjected to an enormous amount of weathering. At one time they were probably amongst the loftiest ranges on the globe, but have now been reduced by meteoric agencies to hills of quite moderate elevation, nowhere exceeding 3800 feet. Although one section of the Tandil system bears the name of *Sierra del Volcan*, no recent eruptive rocks are anywhere to be seen, and the term "Volcan" would appear to be, not a Spanish, but an Indian word meaning a *gap* or *breach*, in reference to the broad depression separating the Volcan ridge from the Tandil range proper.

Argentine Fuegia, and Staten Island

In the Argentine section of Fuegia (see p. 270) the Patagonian steppe is continued beyond Magellan Strait to the southern uplands, skirting the north side of Beagle Channel. As shown in the last chapter, these uplands belong unquestionably to the Andean system, and are continued seawards by the rugged and almost uninhabitable *Staten Island*. This terminal point of the continent towards the south-east consists almost entirely of a rocky snow-clad ridge about 3000 feet high, and 44 miles long, with an average breadth of scarcely 5 miles. It is separated from King Charles South Land by Le Maire Strait, 15 to 18 miles wide, and the whole island, 200 square miles in extent, is of such a forbidding aspect that no attempt has ever been made to form a permanent settlement on its inhospitable shores. Its only in-

habitants are the men in charge of the lighthouse which has been erected at *Cape San Juan,* the terminal headland towards the east.

The Pampas

According to local usage the term *pampa,* meaning any open level tract, is restricted to the treeless, grassy plains which occupy most of the space between the Rios Salado and Negro north and south, and stretch from the Andean plateau eastwards to the Lower Parana and beyond the Plate estuary to the Atlantic seaboard. From the pampas proper are therefore excluded the northern regions of Entre Rios between the Parana and the Uruguay, and Gran Chaco between the Salado and the Bolivian and Paraguayan frontiers.

Although these extensive tracts stand at much about the same levels as the rest of the Argentine lowlands,—generally under 500 feet above the sea,—and undoubtedly formed part of the old marine basin, they still present certain distinctive features which justify the popular usage. Lying much nearer to the Tropics, they enjoy a warmer and moister climate than the true pampas, and are traversed in various directions by large perennial streams, while herbaceous growths are largely replaced in Gran Chaco by thorny scrub, palm-groves, and even dense arboreal vegetation.

Very different is the general, but by no means uniform, aspect of the pampas, which in the north are diversified with stagnant saline basins glittering in the sun, and farther south present a boundless expanse of tall grasses changing with the seasons, and heaving like a billowy sea with every breath of wind. Their appearance at dawn in the summer months has been pictured

by Sir Horace Rumbold in vivid language: "No words can convey an adequate idea of the beauty and freshness of the prairie at this early hour. The young sun floods the low and perfectly level horizon with a flush of pink and yellow light. At once you realise the full force of the hackneyed image, which compares the boundless expanse to an ocean solitude, for the effect is truly that of sunrise out upon the face of the waste of waters. The fiery disk emerges out of what seems a sea of verdure, all burned and brown though everything be in reality, and in its slanting rays the tip of each blade of grass, the giant thistles with their rose-purple crowns, the graceful floss-like panicles of the pampas grass, just touched by the breeze and all glittering with dew, undulate before the eye, like the successive sparkling lines that mark the hazy roll of the deep in the dawn of a tropical calm. This tender tonality lasts but a very short time, the sun shooting upwards with a speed and force that at once completely transforms the picture; the scorching agencies of light revealing it in its true parched colours, and reducing it to a burning arch above, and a scorching and featureless flat below. The fresh rippling ocean turns into a weary wilderness, staring up at a breathless, pitiless sky."[1]

Marvellously varied are the feelings experienced in this wilderness by the wanderer who is at all alive to the grandeur of nature, or endowed with the least poetic fancy. Sublime appears to him the vast expanse of this seemingly interminable ocean of grass and flowers, while the solemn stillness, broken only by the occasional cry of a bird or the roar of the jaguar, bears him away from mother earth to the far-off, unknown, and dimly-realised sphere of some other and more ethereal region. In the

[1] *The Great Silver River*, p. 273.

presence of such an awe-inspiring solitude his thoughts are unconsciously drawn to dwell upon the idea of eternity; a deep and yet a pleasant sadness takes possession of the thoughtful mind, a feeling intensified at the going down of the sun, and in the darkness of night merging in an overpowering sense of helplessness and terror. Many who, after realising a fortune, have returned to Europe, are often again seized with an irresistible yearning for these dreary wastes, and, carried away by a veritable home-sickness, have given up everything in the old land in order to begin life afresh in the pampas.

Nor is it the beauties of nature in a landscape of such monotony that awaken a love of these treeless plains, although the traveller may often be arrested in mute amazement at some fascinating but evanescent picture. Atmospheric effects, seldom missing on bright days, will suddenly transform a distant thistle-field to a forest of the finest timber, while the grass sprouting round a dreary marsh assumes the appearance of a numerous troop of phantom horsemen. But most frequent are the mirages. The wayfarer is mocked by the sight of a watery expanse sparkling in the sun, and when, perhaps tormented with a burning thirst, he gallops forward, he finds the vision still receding in the distance. Experienced residents are doubtless not deceived by such phenomena, but their knowledge is due, not so much to their own better judgment as to the indifference of their horses, who are never the dupes of these fallacious appearances.

The Patagonian Plateau

Southwards the Argentine pampas gradually merge in the Patagonian steppe, which occupies the whole

region between the Andean uplands and the Atlantic, and extends beyond Magellan Strait into East Fuegia. As shown by the river valleys, it is inclined gently eastwards, and like the pampas is disposed at different levels, with an inner zone ranging in terraces from 2000 to 500 feet (the plateau), and an outer falling from 500 feet to sea-level (the seaboard).

The plateau region presents some remarkable features, the explanation of which has given rise to much discussion amongst geologists. The whole land, evidently of Tertiary formation, is strewn with thick horizontal layers of rolled shingle down to a depth of 50 feet for a distance of 600 miles north and south and 200 east and west. The layers consist chiefly of porphyries, recent igneous rocks, and metamorphic slates, and in the lacustrine deposits, composed of sand and volcanic tuffs, are embedded great quantities of animal remains, and the question is, whence came these prodigious masses of gravels, which extend even under the Atlantic waters at least as far as the Falkland Islands. The only possible answer seems to be that they are due to the same atmospheric agencies which have reduced the Brazilian and Ventana uplands by many thousands of feet, and of the Patagonian pre-Cordilleras have left nothing but a few fragments still scattered over the western plains. Much of the débris was, no doubt, contributed by glacial action, its horizontal or slightly inclined position suggesting that the moraines and other detritus were originally deposited in the Atlantic waters, which at that time must have covered a great part of the steppe.

The glacial period must therefore have been followed by the phenomenon of upheaval, or else of subsidence of the sea, of which unmistakable indications have in fact been discovered. Near Possession Bay, at the eastern

entrance of Magellan Strait, a lagoon standing 160 feet above the present sea-level is still inhabited by shell-fish of the same species as those in the surrounding waters, and reference has already been made to some very old kitchen-middens which, since their formation, have been raised to a considerable height above their former level. In this connection it should be mentioned that amongst the animal remains were the skulls and other bones of men of a low type. But they were found, not in the tableland gravels, but in the more recent clays of the Rio Negro valley.

Besides the gravels, extensive tracts are covered with shifting dunes of coarse sand, and also with fine sand, which have been carried by the winds to great distances. They cover vast spaces, especially in the Colorado and Negro basins, stretching at some points right across the Continent from the Andean foothills, where they appear to have originated. They are certainly not of marine origin, but seem to be derived from the immense quantities of débris deposited by the glaciers of the Ice Age in the form of moraines at the entrance of the upland valleys.

Despite their more dreary and monotonous aspect, the Patagonian plains have much the same fascination for travellers as the Argentine pampas. Darwin, who felt the impression years after his visit to this region, asks, why have these arid wastes taken so firm possession of his mind? "I can scarcely analyse these feelings, but it must be partly owing to the free scope given to the imagination. The plains of Patagonia are boundless, for they are scarcely practicable, and hence unknown. They bear the stamp of having lasted for ages, and there appears no limit to their duration through future time."[1]

[1] *Voyage of the Beagle.*

Mr. W. H. Hudson also found the old charm long surviving in all its freshness. "After all the discomforts and sufferings endured in a desert cursed with eternal barrenness, the returned traveller finds in after years that it still keeps its hold on him, that it shines brighter in memory and is dearer to him than any other region he may have visited. In Patagonia the monotony of the plains, or expanse of low hills, the universal unrelieved grayness of everything, and the absence of animal forms and objects new to the eye, leave the mind open and free to receive an impression of visible nature as a whole. One gazes on the prospect as on the sea, for it stretches away, sea-like, without change, into infinitude; but without the sparkle of water, the changes of hue which shadows and sunlight and nearness and distance give, and motions of waves and white flashes of foam. It has a look of antiquity, of desolation, of eternal peace, of a desert that has been a desert from of old, and will continue a desert for ever." [1]

Hydrography—The Parana-Uruguay Basin and Delta

Apart from a few closed lacustrine basins in the pampas and South-West Patagonia, the whole of Argentina drains mainly in a south-easterly direction to the Atlantic. In Argentina proper nearly all the running waters find their way either through the Parana or the Uruguay to the Plate estuary, or through the Colorado and the Negro directly to the coast. But in Patagonia, where the Continent contracts to relatively narrow limits, and increases in aridity southwards, no large fluvial systems are developed, and the comparatively slight discharge is effected through the Chubut, the

[1] *Idle Days in Patagonia.*

Santa Cruz, the Gallegos, and a few other independent coast-streams. Even in the Colorado basin many of the affluents are intermittent, or else run out in saline marshes or lagoons without reaching the main channel at all. In a word, the collective volume of all the other Argento-Patagonian rivers is almost a negligible

RIO SANTA CRUZ.

quantity compared with that of the mighty Parana-Uruguay system, with a catchment basin of 1,200,000 square miles, and a mean discharge of 535,000 cubic feet per second.

But not more than about one half of this basin is comprised within the Argentine State, where the Uruguay is entirely a frontier river, while some of the western affluents flow in their upper courses through

Bolivian territory. The Parana itself does not belong altogether to Argentina until it is joined at the *Tres Bocas* near Corrientes by its great tributary, the Paraguay, from the north. Below the confluence the discharge is greater than at the head of the Plate estuary, the contributions received from the feeble pampas affluents during its lower course being insufficient to compensate for the loss by evaporation. Nevertheless these affluents have the effect of greatly widening the fluvial bed, which expands to a breadth of 40 miles during the floods in the vast Parana-Uruguay delta above Buenos Ayres. Formerly this deltaic region formed part of the marine gulf, which penetrated nearly 300 miles farther inland than at present. The tides even still ascend both the Parana and the Uruguay for a distance of nearly 100 miles; but the fluvial siltings have gradually filled in the broad marine channel all the way from the present head of the estuary to *Diamante*, where the lower course of the Parana bends round from south to east.

A short distance above the mouth of the main channel the monotony of the surrounding treeless flats is relieved by the exuberant vegetation of *Delta Island*, where whole forests of peach trees are in full bloom in the month of August, and where the *seiba* also (*Erythrina cristagalli*) unfolds its gorgeous blossom. These islands of the delta are formed of extremely fertile alluvial deposits, which is often accumulated high above the periodical floodings. Many are swept bodily away by the current and reformed lower down, so that the navigable channels are constantly shifting. But the main branch, known as the *Parana de las Palmas*, is accessible to large vessels even in August, when the water is lowest. Besides this branch, the delta is inter-

sected by several other large arms, and the Parana has altogether as many as fourteen mouths, all subject to periodical inundations.

The Rios Bermejo and Salado

South of the *Rio Corrientes*, which partly drains the shallow and shifting *Ibera* lagoon, the Parana is joined on its left bank by only one notable affluent, the *Gualeguay*, which winds through the province of Entre-Rios nearly parallel both with the main stream and the Lower Uruguay. After a sluggish course of about 250 miles through this Argentine "Mesopotamia," the Gualeguay falls, not into the Parana itself, but into the *Pavon*, one of those lateral channels which are intermittently flushed by the Parana flood waters in the region of the delta.

On its right bank the Paraguay, which is here the frontier river towards the State named from it, receives the already described *Pilcomayo* and the *Bermejo* (*Vermejo*), both rising in the Bolivian Cordilleras, and both winding for hundreds of miles in a parallel south-easterly direction through the Argentine territory of Gran Chaco. The Bermejo, which in its main features greatly resembles the Pilcomayo, has a total length of 1300 miles, but is of little use for any practical purposes. Below Oran it is joined by the *San Francisco*, a stream of equal size, which drains the province of Jujuy, and although both are accessible to light craft above the confluence, the main stream lower down is so obstructed by shoals and reefs, that it is scarcely navigable even by the few flat-bottomed boats that ply on the lower reaches. In this part of its course the fall is so slight that the current is continually wandering right and left into side

branches and shallow lagoons, and about the year 1850 the whole river shifted its bed some 12 miles farther north to the *Rio Teuco.* The old channel is now dry, and the Teuco enters the Paraguay through two arms at *Puerto Bermejo* opposite *Villa del Pilar.*

Below the Paraguay confluence the Parana receives on its right bank only one perennial stream, the *Rio Salado,* often called the *Rio del Juramento* ("River of the Oath"), because it was on its banks that Belgrano's army swore to achieve the independence of the country or perish in the attempt. The Salado, which draws its farthest supplies from the Nevados de Cachi, is known in its upper course as the *Rio Guachipas,* and lower down as the *Rio del Pasaje,* where it is crossed by the main route between Tucuman and Salta.

In its meandering course through Gran Chaco, where the current is scarcely perceptible, it overflows into a labyrinth of lateral branches, backwaters, and shallow lagoons, which during the floods are all merged in a great fresh-water lake. But after the subsidence the water in its lower reaches becomes somewhat brackish; hence this sluggish stream here takes the name of the Salado or "Salt River," which it retains to its confluence with the Parana at Santa Fé above Rosario.

The Rio Dulce and the Cordoba Affluents

South of the Salado the Pampean plains are intersected by numerous watercourses, the direction of whose valleys shows that they belong to the Parana fluvial system. But they seem for the most part to be feeble survivals from a former more vigorous period in the life history of the great artery. With the steadily increasing dryness of the climate, their volume has continued to

fall away to such an extent that one or two have become intermittent tributaries, reaching the main stream only during the floods, while all the others have long given up the struggle to attain their natural goal, and die out in the marshy depressions or shallow lagoons dotted over the grassy steppe lands.

Even the *Rio Dulce*, which has the largest catchment basin, including both the Salta uplands and the Aconquija heights, ramifies in numerous shifting channels aimlessly over the plains, and at last runs out in the *Porongos* morass, which during the inundations becomes a temporary lake communicating southwards with the *Mar Chiquita* ("Little Sea"), a real lake in places over 100 feet deep between the Sierra de Cordoba and the Lower Salado.

From the Cordoba and San Luiz heights descend five torrents, which are rather numbered than named, in their order from north to south, the *Rios Primero, Segundo, Tercero, Cuarto,* and *Quinto* ("First," "Second," "Third," "Fourth" and "Fifth"). These also for the most part run out in the *Saladillo* lagoons and other saline depressions, so that the Parana receives no contributions from all these affluents except through the *Carcarana* (*Carcarañal*), which is formed by the junction of the Terceiro and Cuarto at Saladillo, and reaches the main stream a little north of Rosario.

The Lower Parana and the Plate Estuary

Nevertheless the Parana has survived all these losses, and between the Paraguay confluence and the Plate estuary still remains one of the great rivers of the world, navigable by large deep-sea vessels for a total distance of 1200 or 1300 miles.

The section between Santa Fé and Rosario has a total breadth of 25 or 30 miles, not, however, flowing in a continuous stream, but between countless elongated islands, forming an intricate network of channels and *riachos,* or "little rivers," some of which are over two miles wide. These secondary branches wind away tortuously amid the impenetrable stretches of jungle, developing a trackless system of waterways continually breaking away from and again uniting with the main arteries. "This will give some idea of the magnitude of this stupendous Parana, with its myriad shifting isles drifting on to fill up channel here, swell promontory there, till they compel the waters to force out new passages through the great alluvial wilderness."[1]

The estuary, the *Rio de la Plata,* formed by the junction of the Parana with the Uruguay, and 62 miles wide at Monte Video, discharges more water into the ocean than any other river in the New World, the Amazons alone excepted. During the floods the volume rolled down by the Parana is estimated at 1,650,000 cubic feet per second, while the Uruguay contributes 500,000, making a total of 2,150,000. As this immense body of water is heavily charged with sedimentary matter, the silting process, which has already reduced the marine inlet to less than half its former size, is still in progress. The mean depth at Monte Video is already reduced to less than 15 feet, and constant dredging is needed to enable large vessels to approach the quays of Buenos Ayres. Shoals and quicksands are everywhere forming and reforming at a rapid rate, and the time is approaching when the "Great Silver River," at present about 5000 square miles in extent, with a mean width of 35 or 40

[1] E. F. Knight, *Cruise of the Falcon,* vol. ii. p. 34.

miles, must be reduced to a single narrow channel winding between low muddy banks to the ocean.

The Upper and Lower Colorado Basins

In South Argentina the deterioration of the climate in the direction of excessive dryness has resulted in a curious hydrographic phenomenon, which seems best indicated by the term *disintegration.* The vast *Colorado* basin, which must have formerly comprised an area of probably over 200,000 square miles, has been broken up in such a way as to form two absolutely independent systems —an extensive lacustrine region in the north, with no present seaward outlet, and in the south the *Rio Colorado* itself, reduced to about an eighth of its former basin, but still flowing in a perennial and tolerably copious stream to the Atlantic between the Plate and Negro rivers.

The closed lacustrine system, which has long ceased to communicate at any point with the lower (Rio Colorado) section, covers a great part of the provinces of San Juan and Mendoza, with the western half of the Pampa territory. In the extreme north the large lakes known as the Lagunas *de Guanacache,* which are intermittently fed by the *Rio San Juan* and the western *Rio Bermejo,* send their overflow through the *Rio Desaguadero* to *Lake Bebedero* (the "Drinker"), so called because it acts like a sponge in absorbing the surface waters of all the surrounding saline marshy tracts. Then this shallow lagoon, which expands and shrinks from season to season, communicates during the floods through another desaguadero, called also a *Rio Salado,* with the broad but shallow *Lake Urre-Lafquen,* that is, the *Laguna Amarga* ("Bitter Lagoon"), so named from the intense salinity of its waters.

During its rambling course over the plains the Salado receives irregular supplies on its right bank through the *Rios Diamante* and *Atuel*, which descend from the Argento-Chilian Cordillera south of Tupungato. But the stream which formerly reached the Bebedero from Aconcagua has ceased to flow, and there are other indications, such as the increasing saline efflorescences about the margins of the lagoons, that the process of desiccation is still in progress throughout the whole of this lacustrine region.

Traces only remain of the channel, through which the Laguna Amarga formerly found an outlet through the Colorado to the Atlantic, and this river is thus now completely separated from the chain of shallow lagoons, desaguaderos, swamps, and saline depressions, which at one time constituted by far the larger part of its upper basin. At present the Colorado valley is confined to a relatively narrow strip of the pampas between the parallel of the Laguna Amarga and the Rio Negro, the main stream being formed by the confluence of the *Rio Grande* and the *Rio de Barrancas*, which have their sources on the eastern slopes of the Cordillera near the Peteroa volcano. Although receiving no tributaries in its course through the parched pampean plains, where no rain falls for years, it never runs dry, while in summer it is swollen by the melting snows of the Andes to a deep and rapid stream of great volume from 300 to 400 yards wide.

The Patagonian Rivers and Lacustrine Basins

The *Rio Negro*, which forms the divide between Argentina proper and Patagonia, traverses the steppe in a valley nearly parallel to that of the Colorada. Like its neighbour, it maintains a perennial current without

receiving any supplies throughout its lower course to the Atlantic near the Gulf of San Matias. The Rio Negro, or *Curru Leufu, i.e.* "Blackwater," said to be so named not from its colour, which in fact is sea-green, but from the dangerous reefs obstructing its navigation, is formed by the convergence of two main branches, the *Neuquen*, flowing from *Lake Malbarco* near the Chilean volcano 7000 feet above sea-level, and the *Rio Limay* (*Limay Leufu*), which has its source in the romantic *Lake Nahuelhuapi*, the loveliest fresh-water basin in Patagonia. Formerly supposed to be 50 miles long, it has been reduced by the observations of Moreno to about 40, with an extreme breadth of 9 or 10 miles. But nothing can diminish the impression produced by its pure crystalline waters, in which are reflected the surrounding heights—the bold headlands of its indented shores, above which rise bare, rugged crags, or beach and pine-clad granite peaks, with lofty, snow-white crests closing in the background.

Nahuelhuapi is but one amongst many upland Patagonian lakes, which correspond with those of South Chile on the opposite side of the Great Andes. All alike are of tectonic and glacial origin, and may be described as flooded basins formed by the grinding action of the great glaciers, which, during the Ice Age, descended far lower than at present, and supplied most of the gravels now strewn over the Patagonian steppe.

These lacustrine basins, some land-locked, some with outlets to the steppe rivers, some already silted up, are far more numerous than was formerly supposed. During his exploration of the Argentine Cordilleras in 1894-96, Dr. F. P. Moreno discovered eight new lakes north of, and no less than fifteen south of, Nahuelhuapi, and also for the first time surveyed the mysterious *Rio Futaleufu*,

LAKE NAHUELHUAPI.

which was found to be in some places over 25 feet deep. The beauty and fertility of the whole district are described in glowing language, and a great future is anticipated for these romantic and salubrious uplands, as soon as they are made accessible to settlers by a railway with the east coast.[1]

Although the current of the Limay is swift, it is unobstructed by any reefs or rapids, so that at high water steamers of powerful build might ascend from the Atlantic nearly all the way to Lake Nahuelhuapi, a total distance of nearly 600 miles. Thanks to the picturesque aspect of the surroundings, the ever-flowing stream, broad as the Thames at Westminster, seems to have a magnetic attraction for travellers analogous to that of the waving pampas plains themselves.

Nor is the prospect everywhere so monotonous as might be supposed. At *El Carmen, La Merced* (*Viedma*), and some other settlements along its lower reaches, human industry has transformed the uniform character of the landscape, and Mr. Hudson declares that, when he first sighted the Rio Negro, "never river seemed fairer to look upon, extending away on either hand until it melted and was lost in the blue horizon, its low shores clothed in all the glory of groves and fruit orchards, and vineyards and fields of ripening maize. Far out in the middle of the swift current floated flocks of black-necked swans, their white plumage shining like foam in the sunlight; while just beneath us, scarcely a stone's throw off, stood the thatched farmhouse of our conductor, the smoke curling up peacefully from the kitchen chimney. A grove of large old cherry-trees, in which the house was embowered, added to the charm of the picture, and as we rode down to the gate we noticed the fully ripe

[1] *Geogr. Jour.*, November 1896, p. 578.

cherries glowing like live coals amid the deep green foliage."[1]

South of the Negro follow at long intervals a few other steppe streams—the *Chubut* or *Chulilao*, the *Desire*, the *Santa Cruz*, and the *Gallegos*—all presenting much

ANCIENT EASTERN OUTLET OF LAKE SAN MARTIN.

the same general features, in which is revealed their life history. Rising with several head branches on the slopes of the Cordillera, they receive all their supplies from the Andean snow-fields and the upland lakes of glacial origin, and, with one or two exceptions, are joined by no affluents

[1] *Idle Days*, p. 17.

during their parallel easterly course across the Patagonian plains to the Atlantic.

Of the lacustrine reservoirs, which send their overflow to these steppe rivers, the more important are lakes *Musters*, traversed by the *Rio Senguerr*, chief southern head-stream of the Chubut; *Coluhuape*, a feeder of the

LAKE ARGENTINO.

Desire (Rio Deseado), which was so named by its discoverer, Cavendish, in 1586; lastly, the three lakes *San Martin*, *Argentino*, and *Viedma*, and perhaps others, all belonging now or formerly to the Santa Cruz basin.

Viedma, so named by Moreno in 1877 from its discoverer, Antonio de Viedma, in 1782, is, next to *Lake Buenos Ayres*, the largest of all the Patagonian lakes, being still 50 miles long with a mean breadth of

10 to 12 miles. Traces of several raised beaches show that it was formerly a much larger basin, and at that time communicated through the *Rio Leona* direct with the Rio Santa Cruz. But at present this emissary flows south to the smaller Lake Argentino which drains to the Santa Cruz.

Argentino, discovered in 1868 by Gardiner, also at one time stood at a much higher level than at present. Yet, like all these glacial tarns, it is still extremely deep, Moreno having taken soundings of 120 feet near the margin. Fed by so many lacustrine reservoirs, the Santa Cruz is the most copious of all the Patagonian rivers, with a volume estimated at 30,000 cubic feet per second. It enters the Atlantic below Port San Julian through a long fjord-like estuary, where it is joined by the *Rio Chico* from the north-west.

The Magellanic Lakes

Argentino is followed southwards by another basin standing apparently at the same level of about 300 feet above the sea. But although the exploration of this lacustrine region is still far from complete, Moreno has shown that there are at present no southern extensions of Lake Argentino. Nor is the region between South-West Patagonia and the Magellanic lands so difficult as it has been described by Otto Nordenskjöld, who traversed it in 1895-96, probably in rainy weather. A tract only 10 miles wide, which he tells us his party took three days to traverse on horseback,[1] was covered by Moreno's party in a few hours in 1897 and 1898.

In this transitional zone between the mainland and North-West Fuegia the Swedish explorer describes a

[1] *Geog. Journ.*, October 1897, p. 404.

group of upland lakes, which extend from near Peel Inlet to about the headwaters of the Rio Gallegos, and are completely separated from the Viedma-Argentino basins by the Balueles Mountains. They receive the drainage of this range and of the Latorre escarpments[1] through the

THE CORDILLON OF THE ANDES AT LAST HOPE INLET.

Rio Viscachas from the east, and have no connection with the Gallegos valley, but send their overflow through an unnamed emissary to the head of *Last Hope Inlet*, northernmost of the Fuegian channels.

[1] These escarpments have been wrongly described by some observers as "mountains." The "Lahore range" has no existence, the line of cliffs so named being merely the south-western edge of the Patagonian plateau north of the Gallegos valley (Moreno).

The first link in the chain is *Lake Dickson,* north of Mount Payne, and the last *Lake Maravilla,* about 70 square miles in extent. *Lake Sarmiento,* the second largest member of the group (26 square miles), has no known outlet, but probably also drains to Maravilla. Everywhere in this region the indications of former glaciation on a vast scale are still in evidence, and Nordenskjöld's observations are in complete harmony with the conclusions of other explorers on the morainic origin of the Patagonian gravels.

Climate

Excluding the vertical zones, superimposed in rapid succession on the steep eastern slopes of the Cordilleras, Argentina, although stretching across thirty degrees of latitude, presents a certain uniformity in its main climatic conditions. This uniformity is determined, broadly speaking, by the two elements of heat and dryness prevailing in varying proportions over the whole region.

But although the transitions are everywhere slight, being marked by increasing dryness and diminishing heat in the direction of the south, the results become accumulative when spread over such a vast area. Hence Patagonia, despite its perennial streams accounted for by local conditions, is at once more arid as well as colder than the central provinces, while these are in their turn distinctly drier, though not perhaps perceptibly cooler, than the Gran Chaco territory in the far North. But heat and dryness, where neither is excessive, are the normal constituents of a salubrious climate, from which it follows that the central provinces between the Cordoba heights and the Plate estuary are both relatively and absolutely the most favoured region in this respect,

and in every way the most suitable for European settlement.

These inferences, which are of such vital importance for the future prospects of Argentina, may be regarded as fairly well established, and are fully borne out by the meteorological records from all parts of the country, as in the appended comparative table of temperatures and rainfall:—

Towns.	Latitude.	Mean Temp.	Max. Temp.	Rainfall.
Ushwiya (Fuegia)	54° 53′	42° Fahr.	81° Fahr.	120 in.
Bahia Blanca (Patagonia)	38° 45′	60° ,,	105° ,,	19 ,,
Buenos Ayres	34° 36′	64° ,,	100° ,,	34 ,,
San Luiz	33° 18′	61° ,,	103° ,,	24 ,,
Rosario	32° 56′	63° ,,	101° ,,	40 ,,
Mendoza	32° 53′	60° ,,	100° ,,	6 ,,
San Juan	31° 32′	65° ,,	108° ,,	3 ,,
Cordoba	31° 25′	61° ,,	111° ,,	26 ,,
La Rioja	29° 26′	67° ,,	109° ,,	12 ,,
Catamarca	28° 28′	69° ,,	109° ,,	10 ,,
Santiago del Estero	27° 48′	70° ,,	113° ,,	19 ,,
Tucuman	26° 50′	68° ,,	104° ,,	39 ,,
Salta	24° 46′	63° ,,	109° ,,	23 ,,

Here the general uniformity, as well as the gradual transitions, are well shown in the column of mean temperatures, confined, except in Fuegia, to the narrow range of 60° to 70° Fahr.; and in the rainfall nowhere exceeding 40 inches, though owing to local causes exceptionally falling very low in the Mendoza and San Juan districts. On the other hand, the column of maximum temperature indicates almost everywhere a high degree of summer heat, and this is unquestionably the most unfavourable feature of the Argentine climate. But the picture is not nearly so dark as it looks, being relieved both by the generally short duration of the intense heats and by the dryness of the atmosphere,

which renders them far less oppressive than they otherwise would be. Residents in tropical lands often feel the heat of the torrid zone less irksome than the relatively cooler but more humid summer of the British Isles.

But Argentina is not an earthly Paradise, and serious disturbing elements are the occasional long droughts and the equatorial and antarctic gales, for which there is ample scope in a region unobstructed for over 2000 miles by any barriers higher than the Ventana and Cordoba ranges. The much-dreaded northern *zonda* blows with great fury during the winter months from July to September, sometimes causing the glass to rise and fall as much us 50° Fahr. in a few hours. Farther south the seaboard is exposed to the equally tempestuous south-east trades, the so-called *suestadas*, which prevail for a great part of the year in the Plate region, strewing the estuary with wreckage and stemming the currents of the Rios Parana and Uruguay until they overflow their banks far inland. These trades are to be distinguished from the scarcely less boisterous *pamperos*, or pampas winds, which set in the direction from south-west to north-east, and are at times felt on the Brazilian coast-lands.

These pamperos burst at times with great violence over the plains, at first hot as a furnace blast while driving back the fiery equatorial north winds, then suddenly growing cool and moist like the south-westers in the English Channel. They appear to set up those peculiar electric conditions in the atmosphere, to which has been attributed the so-called *aire* or "air-stroke," a strange kind of paralysis which constantly accompanies them, and attacks both natives and foreigners alike; perhaps twisting up a corner of the mouth, or half-closing one eye, or causing a sudden swelling of the neck. These unpleasant

symptoms, for which sulphur externally applied is said to be a specific, but which may even prove fatal, seem to be really caused by an electric discharge, "for there are authentic cases of two men sitting together being simultaneously seized by this strange and invisible enemy, the one being killed on the spot as by lightning, and the other paralysed in some limb."[1]

At times the droughts last for years, with results disastrous enough to affect the economic conditions of the land. Thus in the province of Buenos Ayres scarcely any rain fell for the five years ending in 1831, and during this *gran seca*, "great drought," nearly all the live-stock was swept away, and the herbaceous vegetation burnt out of the ground. Some of the western provinces, especially San Juan and Mendoza, might almost be included in the rainless zone. But here the torrents which feed the irrigation rills draw their supplies from the melting snows of the Cordillera, while the inexhaustible underground reservoirs have been tapped by Artesian wells to depths of 300 or 400 feet. Nevertheless the indications of increasing dryness cannot be ignored, and men of science are already engaged on the problem, how to prevent a great part of Argentina from gradually sinking to the hopelessly arid condition of the Patagonian tableland.

Flora

In Argentina are distinguished three vegetable zones, which may be roughly described as arboreal, herbaceous, and scrubby. The arboreal finds its greatest development in the Gran Chaco woodlands, but is by no means confined to that region. Wooded tracts also occur in the provinces of Corrientes and Entre-Rios between the

[1] *Cruise of the Falcon*, vol. ii. p. 81.

Parana and Uruguay rivers, while narrow bands of forest growths, continuing the Peruvian and Bolivian montaña southwards, extend along the lower slopes of the Cordillera in the provinces of Salta, Jujuy, and Tucuman, and at intervals all the way to the lacustrine region of South-West Patagonia.

Here flourish both the Antarctic beech and the Chilean *pehuen* (*Araucaria imbricata*), and the European apple-tree, which was introduced by the Jesuits, and has found a congenial home on the eastern slopes of the Cordillera. The vegetation is here also diversified by a tolerably rich growth of aromatic plants, such as the "incense tree," yielding a valuable resin, the *maki*, also resinous, the "Santa Cruz tea," from which is made an infusion with a strong flavour of mint, and the *berberis buxifolia*, which ranges down to the sand-hills and supplies the natives with immense quantities of edible berries.

Perhaps the most conspicuous plant in Gran Chaco is the wax-palm (*Copernicia cerifera*), one of the ten or twelve members of the palm family which are found in Argentina. But more wide-spread is the *algarroba* (*Prosopis*), a kind of mimosa like the carob, which has an immense range, and is of considerable economic value to the natives. There are two varieties,—"the white, which bears shelled fruit resembling our white bean in colour and size, affording an excellent beverage, and could yield flour also; and the black-bearing shelled fruit like our bread bean, and yielding an inferior drink, but a most excellent and abundant flour, with which they make a bread called *patai* by a peculiar and, according to our notions, repulsive process."[1] The bread, somewhat like pounded chestnut, is very nutritious, and

[1] G. Pelleschi, *Eight Months on the Gran Chaco*, p. 70.

this valuable tree also supplies an excellent building material.

Other useful plants are the *vinal*, from which is made a kind of *chichá*, or fermented drink; the *pacará*, a tree of great size and beauty belonging to the mimosa family, the fruit of which contains a large percentage of saponine; the *urunday*, *lapacho*, *quebracho*, and *palo-santo*, all close-grained and useful either for building or fine cabinet-work.

The pampas flora, mainly herbaceous, is characterised by great uniformity, resulting from the wide range of a very limited number of species. Amongst these the most characteristic is the so-called "pampas grass" (*gynerium argenteum*), which is, however, mostly confined to the humid depressions about the Patagonian frontier, and to the uplands, where moisture is derived from the melting snows. It does not thrive on the dry soil of the pampas proper, which are mainly covered with two kinds of herbage, the *pasto tierno* and *pasto duro*, that is, soft and coarse grasses, suitable the one for sheep, the other for horses, both for cattle. Here extensive tracts have been invaded by several varieties of the European thistle, which need little moisture, and in some places have already formed impenetrable thickets. "In most places the rich, dry soil is occupied by a coarse grass, three or four feet high, growing in large tussocks, and all the year round of a deep green. A few slender herbs and trefoils, with long twining stems, maintain a frail existence among the tussocks; but the strong grass crowds out most plants, and scarcely a flower relieves its uniform everlasting verdure. There are patches, sometimes large areas, where it does not grow, and these are carpeted by small creeping herbs of a livelier green, and are gay in spring with flowers, chiefly of the composite

and papilionaceous kinds; and verbenas, scarlet, purple, rose and white. On moist or marshy grounds there are also several lilies, yellow, white and red, two or three flags, and various other small flowers. But altogether the flora of the pampas is the poorest in species of any fertile district on the globe." [1]

In the third or scrubby zone, comprising the Patagonian lowlands, the scanty vegetation is nowhere continuous, except here and there along the river-banks. It consists chiefly of tufty grass and herbs growing round about the stems of thorny bushes. A prevailing form in the Negro valley is the chañar, "a tree in form, but scarcely more than a bush in size. In late October it bears a profusion of flowers in clusters, in shape, size, and brilliant yellow colour resembling the flower of the broom." [2]

Here also grows the willow, probably introduced from Europe, but now "a large tree of a century's majestic growth, forming a suitable perch and lookout for the harpy and gray eagles common in the valley, and the still more common vultures and polybori, and of the high-roosting, noble black-faced ibis; a home and house, too, of the Magellanic eagle-owl and the spotted wild cat; and where even the puma could lie at ease on a horizontal branch thirty or forty feet above the earth" (*ib.*). Another growth of this arid region is the herbaceous evening primrose (*Enothera biennis*), now a familiar object in English gardens. In Argentina it has a wide range, occurring not only in the Negro valley but also in the Buenos Ayres district and as far north as the Rio Salado, everywhere adapting itself to the different conditions of soil and climate. In some places only a few

[1] W. H. Hudson, *The Naturalist in La Plata*, p. 56.
[2] *Idle Days in Patagonia*, p. 50.

inches high, with flowers no bigger than butter-cups, in others it grows tall and rank, five or six feet high, with large flowers emitting only a faint perfume, while elsewhere it is a tall, slender plant, "grass-like among the tall grasses, with wide open flowers about an inch in diameter, and not more than two or three on each plant" (*ib.* p. 239).

On the salt plains in the Upper Colorado basin little is seen except thorny shrubs, whose very leaves have a saline flavour, and huge cacti, which grow here to a larger size than elsewhere. At a distance they look like enormous candelabra, the outstretched arms branching off at right angles from the stem and then throwing off minor branchlets also at right angles, the whole armed with sharp thorns 6 or 7 inches long.

Scenery of Gran Chaco

What may be called the *sociable* character of the Argentine flora, that is, the tendency of certain species to *herd together* in large masses to the exclusion of all rivals, is conspicuous especially in the Gran Chaco, where whole districts take their name from the dominant forms. Thus we have in one place the so-called *palmares*, where little is seen except boundless forests of palms; in another the *algarrobales;* elsewhere the *chañarales*, or the *vinalares* of the tracts exposed to periodical floods. Whole forests are also met with of the *guayac* tree (*Palo santo*), and in many parts the vegetation is wonderfully rich and luxuriant. So exuberant are the tropical growths that it becomes difficult to understand how so limited an area can produce and sustain such dense masses of plants and trees. And, in truth, the ground itself is insufficient for all its offspring. The stems of

the trees have to support the most varied kinds of climbers and creepers, which coil round them with a marvellously-shaded mantle of green profusely decked with flowers of every hue. The traveller wanders for days together beneath the shade of these natural bowers, through which glimpses are rarely caught of the overhanging azure sky.

And if the day with all its glories is so indescribably attractive to the lover of nature, the marvellous nights of these regions still reserve fresh and unexpected charms for him. There is nothing comparable to the impression of serene repose inspired by the sight of the starry heavens, especially in the more open savannahs. Our thoughts revert unwittingly to those lovely nights on the silent deep, when the vessel is borne along as by an unseen power, on the unruffled surface of the waters beneath the vault of a tropical sky. The charm is heightened by the countless swarms of fire-flies, whose phosphorescent lamps flash out and again suddenly disappear in the gloom. But these are visions to be seen in order to be felt; such nights must have been actually experienced, for it is as impossible to describe as it is to forget the varied effects they produce on the mind of the lonely wayfarer.

Fauna

Reference has already been made to the extinct faunas of the pampean and Patagonian Tertiary formations, showing that animal life was formerly far more abundant in those regions than is now the case. At present the Rio Negro forms to some extent a zoological as well as a botanical parting-line, as indicated by the two species of the *rhea* ("American ostrich") and of the jaguar, the

smaller in both cases being confined to Patagonia, the larger ranging the northern regions.

Peculiar to the extreme south are also two varieties of the wild cat, a dwarfish armadillo (*Dasypus minutus*) and some species of the mouse family, which are here more numerous than elsewhere. But the divide is crossed by the ubiquitous puma and guanaco, which range to the extremity of the continent, and, of course, by many birds, which, however, acquire new habits in the southern steppe lands, where the conditions of life are more difficult. Thus the condor, whose flight is mostly restricted to the uplands in Peru and Ecuador, descends in Patagonia down to sea-level. Water-fowl, both waders and swimmers, are represented in great variety and in vast numbers, and include some distinct species, such as the "steamer duck," the black-necked swan and the flamingo, which is of smaller size but richer colour than its African congener. Scenes of extraordinary animation are often presented by the pampean lagoons, where at the crack of a rifle countless flocks of all kinds rise suddenly on the wing, "strings of wild duck of half a dozen species; clouds of sandpipers and teal; bronze ibises—beautiful birds with glossy dark green and coppery plumage—shooting past like arrow-heads, which they exactly resemble in their flight; herons and cranes innumerable; serried columns of gorgeous flamingos, their scarlet wings all glowing in the sun; the rare and lovely roseate spoonbill."[1]

Of the numerous species of rails the finest is the *ypecaha*, which is one of those birds given to holding public gatherings and dancing performances. "A number of ypecahas have their assembling places on a small area of smooth level ground just above the water, and hemmed

[1] Rumbold, p. 280.

in by dense rush beds. First, one bird among the rushes emits a powerful cry, thrice repeated, and this is a note of invitation quickly responded to by other birds from all sides as they hurriedly repair to the usual place. In a few moments they appear to the number of a dozen or twenty, bursting from the rushes, and running into the open space, and instantly beginning the performance. This is a tremendous screaming concert. The screams they utter have a certain resemblance to the human voice, exerted to its utmost pitch, and expressive of extreme terror, frenzy and despair. A long piercing shriek is succeeded by a lower note, as if in the first the creature had well-nigh exhausted itself. While screaming the birds rush from side to side, as if possessed by madness, the wings spread and vibrating, the long beak wide open and raised vertically. This exhibition lasts three or four minutes, after which the assembly peacefully breaks up."[1]

Of the pampean mammals the most characteristic is the *vizcacha*, which corresponds to the North American prairie dog, and like it lives in friendly association with the burrowing owl and other night birds in their common underground dwellings. "This large rodent inhabits a vast extent of country, north, west, and south of the true pampas, but nowhere is he so thoroughly on his native heath as on the great grassy plain. He lives in a small community of twenty or thirty members, in a village of deep-chambered burrows, and as the village endures for ever, or for an indefinite time, the earth constantly being brought up forms a mound 30 or 40 feet in diameter, and this protects the habitation from floods on low or level ground. Again, he is not swift of foot, and all rapacious beasts are his enemies; he also loves to feed on

[1] *The Naturalist in La Plata*, p. 267.

tender succulent herbs and grasses, to seek for which he would have to go far afield among the giant grass, where his watchful foes are lying in wait to seize him. He saves himself from this danger by making a clearing all round his abode, on which a smooth turf is formed; and here the animals feed and have their evening pastimes in comparative security; for when an enemy approaches he is easily seen; the note of alarm is sounded, and the whole company scuttle away to their refuge. In districts having a different soil and vegetation, as in Patagonia, the vizcachas' curious, unique instincts are of no special advantage, which makes it seem probable that they have been formed on the pampas."[1]

On the whole the reptile world is poorly represented, and seems to show a tendency towards degradation in the direction of the south. Thus the *Jacaré* alligator, although numerous in the Corrientes waters, scarcely anywhere exceeds six or seven feet in length. The boa and the rattle-snake range, the former no farther south than Santiago del Estero, the latter than the Cordoba heights. On the other hand, insect pests, such as mosquitoes, the horrible *ixodes*, a tick of the jigger type, and the tiny but bloodthirsty *bicho* colorado ("red beast"), abound to such an extent as to render some districts almost uninhabitable. "The ticks, inhabiting regions rich in bird and insect life, but with few mammals, are in the same condition as mosquitoes, as far as the supply of blood goes; and, like the mosquitoes, they are able to exist without the nourishment best suited to them. They are nature's miserable castaways, parasitical tribes lost in a great dry wilderness where no blood is; and every marsh-born mosquito, piping of the hunger gnawing its vitals, and every forest tick, blindly feeling with

[1] *The Naturalist in La Plata*, p. 10.

its grappling-irons for the beast that never brushes by, seems to tell us of a world peopled with gigantic forms, mammalian and reptilian, which once afforded abundant pasture to the parasite, and which the parasite perhaps assisted to overthrow." [1]

These noxious pests are in their turn preyed upon by the dragon-flies which, like the locusts of the Old World, occasionally visit the pampas and the Patagonian steppe in countless myriads. There are several varieties, some three or four inches long, but all associate together in these tremendous "dragon-fly storms," which come, not with the cold south-western gales, but in advance of them, hence called *hijos del pampero* ("children of the pampas wind"). At times they arrive almost simultaneously with the storm, going by like a flash, and instantly vanishing from sight. "You have scarcely time to see them before the wind strikes you. As a rule, however, they make their appearance from five to fifteen minutes before the wind strikes; and when they are in great numbers, the air to a height of ten or twelve feet above the surface of the ground is all at once seen to be full of them, rushing past with extraordinary velocity in a north-easterly direction. When they pass over the level, treeless country, not one insect lags behind or permits the wind to overtake it. But on arriving at a wood or large plantation they swarm into it, as if seeking shelter from some swift pursuing enemy, and on such occasions they sometimes remain clinging to the trees while the wind spends its force" (*ib.* p. 131). But instead of consuming the vegetation, these carnivorous creatures fall upon the bush-ticks, gnats, sand-flies and similar pests, causing them to vanish like smoke.

Most European domestic animals have been success-

[1] *The Naturalist in La Plata*, p. 142.

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fully introduced. Some, such as the horse, have even run wild on some of the uplands, while others, such as the sheep and horned cattle, have undergone slight modifications of form in the process of adaptation to their new surroundings. Such changes, advantageous to the animal in the struggle for existence, have not always proved profitable to its owner. Thus the *criolla*, or old pampa breed of sheep, had developed in the course of three centuries into a distinct variety characterised by tall, gaunt bony frame, great agility and endurance, but with lean, dry flesh, like venison, and long, straight wool, like goat's hair, hence of little use as a wool and food-producing animal. This breed has accordingly everywhere, except in the poor localities, been either improved by crossing or else replaced by fresh stock from Spain and England. All these animals have multiplied prodigiously, and constitute at present the chief source of wealth in a country which suffers from a deficiency of moisture, and is consequently better suited for stock-breeding than for tillage.

CHAPTER XI

ARGENTINA—(*continued*)

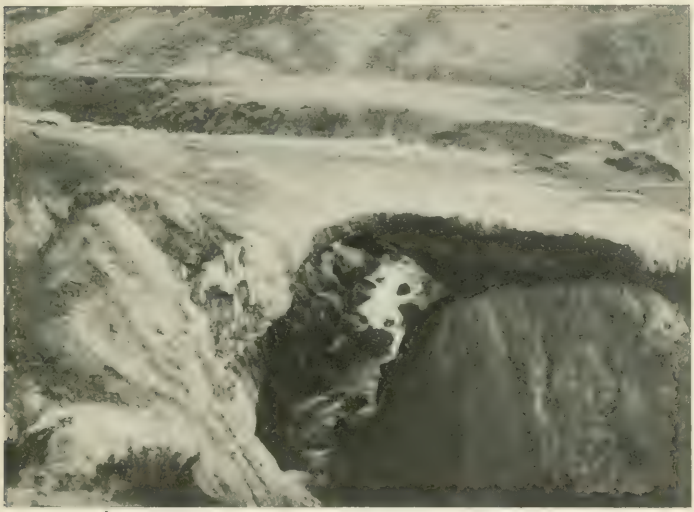
Inhabitants—Prehistoric Peoples—The Pampas Indians and Guarani of the Missions—The Calchaquis and Gran Chaco Indians—The Tobas and Matacos—The Gauchos—The Patagonians—The Argentinos and Italians — Topography — Historic Retrospect — Material Progress — Railway Enterprise—Agriculture and Stock-breeding—Government —Political Situation—Religion—Education—Defences.

Inhabitants—Prehistoric Peoples

It was shown in Chapter II. that at the time of the discovery the South American cultural area was mainly confined to the western uplands from the Cundinamarca plateau to the southern limits of the Peruvian empire. But there are indications that at a still more remote epoch the civilisation represented by the Incas had been preceded by a different culture widely diffused over the eastern slopes of the Argentine Cordillera, and even on the now arid lowlands between the present provinces of Jujuy and Mendoza. The so-called "Incas' Road," which may still be followed for hundreds of miles over the plains with branches ramifying in various directions, is believed by some archæologists to date from pre-Inca times.

Here also have been discovered certain rock inscrip-

tions or carvings, the remains of extensive irrigation works, stone and metal objects, and some other evidences of an ancient civilisation, of which no memories have survived, and which would seem to have gradually disappeared with the growing deterioration of the climate in the Upper Colorado basin. What became of the peoples associated with these remains? Did they with-



THE INCAS' BRIDGE ON THE MENDOZA-SANTIAGO ROAD.

draw to the Andean plateaux, and found new seats on the shores of Lake Titicaca, where afterwards rose the megalithic monuments of Tiahuanaco?

There is abundant evidence to show that in remote times, under more favourable climatic conditions, both the pampas plains and the Patagonian steppe were far more thickly peopled than at present, though not by races that can be described as cultured, in the ordinary

sense of the term. They appear to have nowhere advanced beyond the New Stone Age, as shown by the rude pottery dug up in the numerous *paraderos* or stations of early man strewn over the pampas between the Rio Carcaraña and the Plate estuary. The rude stone implements occurring in abundance in the glacial drift of the Rio Negro and elsewhere, together with the human remains found in association with the extinct pampas fauna, and also in the shell mounds of the coast and the interior about the head of the old Plate estuary, when it penetrated 200 or 300 miles farther inland than at present, show further that these regions had been occupied in still more remote times corresponding with the Old Stone Age of the northern hemisphere.

Abundant proofs of former human settlements on the now lifeless Patagonian wastes have been collected by Mr. Hudson on the exposed sites of numberless villages of the former inhabitants of the Negro valley. "I have visited a dozen such village sites in the course of one hour's walk, so numerous are they. Where the village had been a populous one, or inhabited for a long period, the ground was a perfect bed of chipped stones, and among these fragments were found arrow-heads, flint knives and scrapers, mortars and pestles, anvils, perforated shells, fragments of pottery. The site where I picked up the largest number had been buried to a depth of seven or eight feet; only where the water had washed great masses of sand and gravel away the arrow-heads, with other weapons and implements, had been exposed."[1]

The Pampas Indians and Guarani of the Missions

Probably nine-tenths of the different tribal groups in

[1] *Idle Days in Patagonia*, p. 39.

possession of the land at the advent of the whites have since disappeared, either absorbed in the general Hispano-American population, or exterminated during the early border warfare, or by the systematic policy of the Argentine administration in recent years. Thus the *Querandi*, *Ranqueles*, and others of the Plate district, collectively called *Pampas Indians*, who for a time successfully resisted the first efforts of the Spaniards to gain a footing on the south side of the estuary, and afterwards continued their predatory expeditions for over two centuries right up to the walls of Buenos Ayres, were at last seriously taken in hand in 1879, and practically cleared out by General Roca's well-devised "plan of campaign." In a few years vast tracts previously exposed to their incursions were thrown open to settlers, and a greater change effected in the ethnical relations than had been brought about since the first occupation of the land.

In the region between the Parana and the Uruguay, the natives, mostly of *Guarani* stock and less warlike temperament, had at an early period been gathered by the Jesuits about the stations, and although the "missions" were afterwards broken up, the majority of these *mansos* ("tame") Indians were gradually absorbed in the general white population. A like destiny was experienced by the bulk of the *Calchaqui*, the dominant people of the north-western provinces, who had already before the conquest been brought into contact with the Incas, spoke the Quichuan language, and were possibly of Quichua descent. Farther south the pampas were roamed by the *Gennakens*, who were of a different type from the Patagonians, and spoke a different language. but they are now nearly extinct, not more than about thirty men surviving in 1906.

In the extreme south also most of the Patagonian *Tehuelches* have lately been induced to give up their nomad existence and form peaceful settled communities in the more favoured districts of the plateau. But in Gran Chaco the fierce *Tobas*, the *Lules*, *Vilelas*, *Mocovis*, *Abipons*, *Matacos* are still in the wild state, and have hitherto shown little inclination to adopt civilised ways. Thus it appears that, except in this still scarcely explored wilderness, the aboriginal element has everywhere been well-nigh eliminated, and the whole land from Corrientes to Fuegia secured in perpetuity for the peoples of Caucasian stock.

The Calchaquis and Gran Chaco Indians

Of the former inhabitants of Argentina the Calchaquis were both the most numerous and the farthest removed from the savage state. They were formerly widely diffused over the plains between the Cordoba heights and the Cordilleras, and were long dominant in the present province of Tucuman, but gradually disappeared as a distinct nationality after their final overthrow by the Spaniards in 1664. At that time the *Quilmes* branch were removed to the settlement of Buenos Ayres, where some of their descendants survived till the middle of the nineteenth century, and where the name is perpetuated in one of the suburbs of that city. The names of other branches are similarly kept alive by such geographical terms as *Famatina*, *Fiambala*, *Andalala*, *Tinogasta*, and many others scattered over the former Calchaqui domain. Moreover, while the race has been subdued and absorbed, their old Quichua language still flourishes, and in the Punilla and other districts is currently spoken by all classes, by the lower orders exclusively, by the upper jointly with Spanish. This is another illustration of the well-known

fact that certain forms of speech—English, Arabic, Malay, Quichua—are endowed with intense vitality, and persist for ages under the most adverse circumstances.

In Gran Chaco the Guarani race is chiefly represented by the semi-independent *Chiriguanos*, who also range across the frontier into South-East Bolivia. Although said to have been conquered by the Inca Yupangui at a time when they were still utter savages and cannibals of a pronounced type, they afterwards held out long against the Spaniards, and even defeated the expedition of 1571 led against them by the Viceroy Toledo in person. At present the Chiriguanos are mostly of Spanish speech, and seek employment on the sugar plantations about the Bermejo and Juramento rivers.

According to the protracted researches of Señor Lafone-Quevedo,[1] most of the still independent Gran Chaco wild tribes belong to the *Guaicuru* or *Mbaya* family, the chief members of which are the fierce and powerful *Tobas* of the Pilcomayo valley, the *Mocobi*, the *Lules* and the nearly extinct *Abipons* of the Bermejo, and the *Matacos* (*Mataguayos*) along the west side of the Paraguay and Parana between the Pilcomayo and Salado confluences.

The Tobas and Matacos

Although far from numerous, probably less than 20,000 altogether, the Tobas are amongst the most powerful and aggressive of all the South American wild tribes. None of them have ever been reduced, and they have hitherto repelled all friendly and forcible attempts of the whites to gain a permanent footing in their territory. They are typical American aborigines, tall

[1] Numerous Papers in the *Boletin del Instituto Geografico*, Buenos Ayres, 1890-1906, and elsewhere.

(5 feet 8 inches to 6 feet), slim, bony, with very long, lank black hair, of rather light brown colour, extremely wary and, like the prairie Indians, men of few words. A scene witnessed by Mr. Knight on the banks of the Paraguay shows that there is no exaggeration in Cooper's pictures illustrating the taciturn disposition of his Iroquois heroes: "We saw four Indians come stealthily down to the bank armed with long lances. Then, lying down among the reeds, they gazed silently into the water till they saw some big fish pass by, when, with wonderful skill, they speared them one after the other, and threw them on the bank. Next they lit a fire, roasted the fish they had caught, and devoured them. This done, they picked up their weapons and crept back into the woods as noiselessly and stealthily as they had come. The whole time—some three hours—not one of these men spoke a word; they gave the necessary directions to each other by slight inclinations of the head only."[1]

Even from a distance the Tobas are known from their peculiar walk, which resembles that of a highly-trained stepper. The habit, however, is not racial, but due to the necessity of raising the foot at each step to the level of the knee when traversing the marshy Pilcomayo districts, and the motion thus acquired is retained on dry ground. It may be compared with the custom of the Dinkas and some other low races of resting on one leg, with the other planted against it at a sharp angle. Even in repose they have to be ever on the alert against human and other predatory animals. The Tobas are true nomads, moving about without any settled abodes, living entirely on hunting and fishing, and, like the Patagonians, given to drunken orgies often kept up for days together. Maintaining a state of perpetual warfare

[1] *Cruise of the Falcon*, vol. ii. p. 102.

with all their neighbours, they go always armed, chiefly with the spear and club, and after the fight bring the mangled remains of the enemy home to the family, reserving the head for themselves. They are thus inured to scenes of carnage from their childhood, and it is considered a mercy to despatch the infirm and aged, and thus relieve them from a lingering natural death, which all despise.

Although rated by Pelleschi as the lowest of all the Chaco Indians in the social scale, the Matacos are far less ferocious, and lead more settled lives, than the Tobas. They are generally well disposed towards the whites, and take part with them in their wars against the hostile tribes. But they cannot count beyond *four*, and a famous Mataco chief, interviewed by Pelleschi, found it a hard task to reckon up the large number of the enemy that he had slain in his time. After reaching the fourth he got puzzled, and, "sitting down cross-legged on the ground, began making marks on the earth with his finger, exclaiming at each one *toch, i.e.* 'this,' raising his head each time as well as his hand, and looking at me, added *uuidt toch*, 'and this one too'; and so he went on until he reached about a score, always, however, turning towards me that I might understand that, besides these, there were always the four fingers, until at last I was tired out with *ntocq, ntocq*, 'many, many.'"[1]

The Gauchos

Although the *Pehuelches*, or *Pampas Indians*, have disappeared as a separate ethnical group, they have, in a sense, been replaced by the *Gauchos*,[2] who are usually

[1] *Op. cit.* p. 289.

[2] Properly *Gacha*, an Araucanian word meaning "Friend," or "Companion," and used as a term of address, like the American "Stranger."

described as half-breeds—whites on the father's, Indians on the mother's side. But Señor Moreno is inclined to regard the true Gauchos, *i.e.* the "Chinos," now nearly extinct, as almost full-blood aborigines, while the Gauchos properly so-called are rather direct descendants of the conquerors, especially the *Moriscos*, with a large

GAUCHO.

strain of Arab blood, further modified by gradual adaptation to their new environment. The typical Gaucho is essentially a child of the steppe, round whom a certain halo of romance has been thrown by his wild venturesome life, his apparent chivalry, love of finery, splendid horsemanship, and that air of courtesy which belongs to all of Spanish blood. But

those who know them best do not regret the gradual disappearance of these "pampean centaurs," who, after playing perhaps a useful part during a transitional period between rude and civilised social conditions, are now receding before the steady advance of the "Gringos,"[1] or white immigrants from almost every country in Europe. There are of course Gauchos and Gauchos, and some have undoubtedly earned an evil repute for brigandage, and even piracy, where they have given up the horse for the canoe about the Lower Parana reaches. Those met by Mr. Knight in the upper provinces are described as "a cut-throat looking lot of ruffians; ragged, weather-beaten outlaws, each with his long knife at his back, many with *bollas* and *lassos* ready to bring down any stray cattle that might come by on their lonely wanderings" (*op. cit.* vol. i. p. 250). But, on the other hand, instances of nobler qualities are on record, and many have shown great courage and loyalty in the service of those whites whom they had learned to trust and respect.

But they must soon get crowded out, for they find it difficult to exchange their restless habits for the sedentary life of the settlers and of the townsfolk, all of whom they despise. It is curious to meet a Gaucho from the pampas strolling through the busy streets of Cordoba or Rosario, where he feels so out of place in his striped poncho, his laced pantaloons, and leather belt ornamented with bright coins. He takes no interest in anything, but looks with contempt on all the surroundings. "Life in the saddle, on the pampas or in the monte (bush), is the only life he knows or cares for. Horse-stealing and cattle-lifting, in his opinion, are the only pursuits worthy of a man"

[1] That is *Griegos*, or "Greeks," so called because supposed to speak "Greek," *i.e.* any language other than Spanish. Cf. the English expression, "that is Greek to me."

(*ib.* p. 137). The last genuine Gauchos, who retained the traditions of the race and were recognised as a distinct element in the Argentine social and political system, are said to have been the so-called *Llanistas* of the La Rioja district, who, however, should be distinguished from the Pampean Gauchos, having a larger admixture of Indian (Huarpe and Calchaqui) blood. At first the Llanistas were retainers of two powerful local families, then during the civil wars joined the ferocious Facundo Quiroga, with their dreaded banner: "Religion or Death."

Some of the stories told of the amazing powers of observation and sagacity of these free lances may not be true, but they serve to indicate the reputation they have earned for such qualities. If they lose their way by night, they pluck some grass and taste it, go a mile or two on and taste some more, and thus find the direction of the river, lake or wood they wish to reach. By the flight of birds, by a cloud of dust, they can tell the number of the approaching tropillas (caravans), and Mr. Knight knew of one who never forgot the footprint of man or horse to which his attention had once been directed. On one occasion while travelling he stopped suddenly, and pointing to a print, said, "The little gray horse stolen from my master, Don Luis, three years ago, passed here an hour ago." So it turned out, and the horse was recovered (*op. cit.* vol. i. p. 220).

The Patagonians

Beyond the Rio Negro the Chilian Araucanians have crossed the Cordillera at several points. But there was little inducement for them to range far down the fertile and well-watered slopes of the mountains everywhere

merging in the arid wastes of Patagonia. Hence the whole of this region from the Negro to Fuegia has remained from remote times in the unchallenged possession of the gigantic race, whom the companions of Magellan by mistake called "Patagones," or "Big Feet," these extremities being in fact rather small compared to their large figures. The error arose probably from their custom of wearing in cold weather loose guanaco-skin wraps over their boots, thus giving an ungainly appearance to the feet. No native collective name is known, if any exists, for all the tribal groups; hence anthropologists have now adopted the term *Tehuelche*, applied by the Araucanians in a general way to the whole race. After the first accounts published by Pigafetta, historian of the Magellanic expedition, other observers, improving on those accounts, reported the existence in the same region of a veritable race of Anaks ranging in height from 10 to 12 feet. But such reports are generally regarded as fabulous, and there is no reason to suppose

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that the present Patagonians differ appreciably in their physical characters from those first sighted by Magellan. They were nevertheless universally regarded as the tallest people in the world, with a mean height of from 6 feet to 6 feet 4 inches, until the members of the recent Ehrenreich expedition showed by accurate measurements that the Bororos of Central Brazil were of about the same colossal stature.[1] There are even other reasons for thinking that the Tehuelches may be descended from some Bororo immigrants into Patagonia in prehistoric times; but the question is of too speculative a nature for discussion in these pages.

A memorable account has been left us by Lieutenant Musters of the wandering life of these steppe nomads, witnessed and even shared in by him on one eventful occasion, when he accompanied their wandering expeditions from one end of Patagonia to the other. Having completed his arrangements with the Tehuelche chief Orkeke, he started in August 1869 from a settlement on the Santa Cruz on his long journey northwards with a band of these natives. The march was one long hunting excursion, varied with murderous wranglings and encounters, generally of a friendly nature, with other kindred groups. For the Patagonians are not a warlike people, and though very quarrelsome amongst themselves, especially in their drinking bouts, have always lived on a peaceful footing with their neighbours.

When on the march, a halt of a few days would now and then be made in some verdant glen, where the produce of the chase would be cooked and eaten, and the *toldos* pitched for the night's rest. The toldo, a kind of

[1] Dr. Paul Ehrenreich, *Urbewohner Brasiliens*, pp. 121, 125. Some of these Bororos were found to be 6 feet 4 inches in height, although "the tallest were not measured."

tent, easily constructed, is the only shelter of this homeless, wandering race. A row of forked posts about 3 feet high is driven into the ground, and a ridge-pole laid across in front of these; at a distance of about 6 feet a second row 5 feet high, also with a ridge-pole; and at the same distance from these a third row 6 feet high is fixed. A covering made of guanaco skins, smeared with a mixture of grease and red ochre, is drawn over from behind and secured by thongs to the front poles. Hide hangings, fastened between the inner poles, partition off the sleeping places, while the baggage piled round the sides serves to exclude the cold air. In bad weather an additional covering is secured to the front, and brought down over an extra row of short poles, making all snug. The duty of pitching and striking the toldo devolves on the women, a number of whom accompanied the party, who were mounted on good serviceable horses ridden without saddles.

Ascending the Chico valley towards the north-west they soon came in sight of the snowy Cordillera, which for hundreds of miles limited the view on their left. Moving along the base of the mountains, excursions were occasionally made into the upland valleys and wooded slopes, where wild cattle were chased. Farther north the country became more wild and rugged, being furrowed by narrow ravines, deep and gloomy gorges through which flowed torrential streams. Beyond the Rio Limay a visit was paid to the more settled *Manzaneros*, who are so called from their headquarters, the old Jesuit station of Las Manzanas, but are called *Chennas* by the Patagonians, and are an eastern branch of the Araucanians. From the Jesuits they appear to have acquired the art of extracting a good cider from the apples of the district, and also a stronger drink from the algarroba bean. But

the Tehuelches have nothing but the vile foreign spirits which, combined with epidemics, and especially small-pox, is rapidly thinning their numbers. In Musters' time they had been reduced from over 20,000 to 3000, and were estimated in 1899 at not more than 300 souls.

Besides their tall stature, this observer describes them as exceedingly well proportioned, with an astonishing muscular development in the arms, great walking power, and the faculty of enduring total abstinence from food for days together with little or no inconvenience. Hardships and labour produce no ill effects even on the women, though age renders them quite repulsive. The men wear the *chiripa* (drawers), never laid aside, and a warm loose cloak of guanaco skin, with hairy side in and the outside painted in various colours. The hair is retained by a broad fillet, or even a net, and that of the women worn with two pigtails, at times eked out with horse-hair. Both sexes wear silver ornaments, and bedaub the face with red ochre or black earth and tattoo the fore-arm.

They are great smokers, drinkers, and gamblers; but in the wild state their chief business is the chase, pursuing the rhea and guanaco on horseback, and capturing them with the bola, in the use of which they excel. They worship, not the sun, but the new moon, and also believe in a great spirit, who created the Indians and the animals, and dispersed them from a certain hill in the interior of the land. But he is too good to injure them; hence all their attention is devoted to the evil spirits, and especially the *gualichu* or chief demon, who has to be propitiated, or warded off by the medicine man. The gualichu takes up his position at the back of the toldo, always on the look out for an opportunity to molest the inmates. He may even enter the body and cause sickness, which the

medicine man is expected to cure, while other evil beings inhabiting underground dwellings are warded off by respectful salutations and spells. The medicine men—wizards, doctors, priests all in one—have also to foretell the success or failure of undertakings, the issue of sickness and the future generally; hence theirs is not an enviable position, the failure of their predictions being often punished with death. But, on the other hand, they are everywhere received with honour, and welcomed at all festive gatherings.

Summing up their moral character, Lieutenant Musters describes them, not as ferocious savages and brigands, but rather as kindly, good-tempered, impulsive children of nature, moody perhaps, and fanciful in their likes and dislikes, hence firm friends or confirmed enemies, untruthful in minor matters, but always loyal to those whom they have learned to trust. All have now given in their submission to the Argentine authorities, no longer go about armed with the national spear and buckler, and even call themselves Christians. In any case the cruel practices formerly associated with their burial rites have fallen into disuse, and the bones of the dying are no longer broken, either to hasten the end or prepare them the more easily for interment in a foreshortened attitude.

The Argentinos and Italians

Except the Calchaquis and Huarpes in the remote interior, there were no settled communities in the Argentine lands at the advent of the white man. All the other aborigines were in the wild state, mostly nomads scattered thinly over the country. Hence few alliances could take place between them and the intruders, and the result is that the Argentinos proper show a slighter strain of

Indian blood than most other Hispano-Americans. On the other hand, there is good reason to think that amongst the first settlers there was a considerable percentage both of Basques and of Moriscos, that is, forcibly converted Arabo-Berber Muhammadans from the southern provinces of the peninsula. The Basque language continued to be long current in several districts, and in the local Spanish idiom many Arabic terms occur, which have died out or had never found their way into the Castilian of the central and northern provinces. But all are now merged in a single nationality, whose homogeneous character is menaced by the large stream of European immigrants steadily pouring into the country, especially from Italy.

At first arriving with the intention of returning to their homes after earning enough to live at ease for the rest of their days, the Italians have in recent years shown an increasing tendency to remain in a land where they are welcomed, where the conditions of existence are easier, and where their sons escape from the hated conscription. To capitalists they are a source of great wealth, for their labour is both cheap and good. They are preferred to all others as day labourers on the farms, being hard workers, frugal and contented, and with a little instruction they soon make excellent mechanics. They already number considerably over half a million, keeping somewhat aloof from the rest of the population, and maintaining their own schools, to which the Italian Government contributes, on the condition that the teaching be carried on in the Italian language. But this artificial aloofness must gradually yield to the subtle influences which tend to uniformity in all large political communities, and the slow process of fusion will doubtless bring about new ethnical combinations of all the Latin and Teutonic

elements, on the consequences of which it would be premature to speculate.

Topography

In Argentina the rapid material progress of the last few decades is reflected in the great increase of the urban groups, several of which, mere rural villages a few years ago, are now flourishing cities of many thousand inhabitants. The subjoined table shows that towns with populations of 10,000 and upwards are more numerous than in any other South American State, while Buenos Ayres, capital of the republic, is by far the largest city in the whole of Latin America, and outnumbered only by three in the United States—New York with Brooklyn, Chicago and Philadelphia.

Towns.	Pop. (1906).	Towns.	Pop. (1906).
Buenos Ayres	1,057,000	San Juan	11,500
Rosario	150,000	Gualeguay	11,000
Cordoba	53,000	San Luis	10,500
La Plata	80,000	Concepcion	10,000
Tucuman	55,000	Santiago del Estero	10,000
Mendoza	32,000	Barrancas al Sud	10,000
Santa Fé	33,000	Mercedes	10,000
Parana	27,000	Azul	8,000
Corrientes	18,000	Pergamino	8,000
Salta	18,000	Nogoya	8,000
San Nicolas	15,000	Dolores	8,000
Chivilcoy	15,000	Catamarca	7,000
Gualeguaychu	13,000	La Rioja	6,000
Concordia	13,000	Tandil	6,000
Rio Cuarto	12,000	Bahia Blanca	3,800

In the territory of Misiones and the province of Entre Rios the few agricultural settlements—*Concepcion, Santo Tomé, Yapeyu, Monte Caseros*—nearly all occupy the sites of the old Jesuits' "missions," and are still inhabited by quiet, industrious half-breeds, amongst whom

the Guarani element largely predominates. Yapeyu, on the right bank of the Uruguay, was for a time the headquarters of these missions, but has since been re-named *San Martin*, in honour of the famous revolutionary hero born in this place. Farther down follow the riverine ports of *Concordia*, facing the Uruguayan town of Salto, and *Colon*, opposite Paysandu, both accessible to large steamers at high water. Colon serves as the outlet for the produce of the thriving colony of *San José*, founded by some Swiss and Savoy peasants in 1863. *Gualeguaychu* and *Gualeguay*, both named from the sluggish streams on which they stand, have shared in the prosperity of this fertile "Mesopotamia," and are now amongst the richest places in Entre Rios. But at present the largest town in this province is the port of *Parana*, which faces Santa Fé on the main stream, and for a time (from 1852 to 1861) enjoyed the distinction of being the capital of the Republic.

Corrientes, capital of the province of Corrientes, was founded in 1588 on the left bank of the Parana 15 miles below the Paraguay confluence and 830 miles above Buenos Ayres, with which it is connected both by rail and by a regular service of steamers. Its full name is *San Juan de los Siete Corrientes* ("St. John of the Seven Currents"), in reference to the rapids which are developed by the reefs projecting at this point of the river without, however, offering any serious obstruction to the navigation. Corrientes is one of the largest places on the left bank of the Parana, and here have been established the building and repairing docks for the steamers plying between the estuary and Paraguay.

On the west side of the Parana the improved communications by rail and river have attracted numerous settlers from France, Germany, Switzerland, and Italy to

the province of Santa Fé, which is named from its capital, the city of Santa Fé, founded by Juan de Garay in 1573 at the confluence of the Salado with the main stream. Santa Fé, formerly the headquarters of the Jesuits' missions among the refractory Gran Chaco Indians, is now a flourishing riverine port, serving as the outlet for the produce of *Esperanza* and the many other agricultural stations of the surrounding district, which owe their prosperity mainly to the system of small holdings here adopted. The capital, which is rapidly encroaching on the plains south of the Salado, does not stand on the main stream, but on a lateral riacho (branch), draining the shallow Guadalupe lagoon to the Colastine channel. Here is the port of *Colastine*, which is accessible to vessels drawing over 20 feet even at low water, and is connected with Santa Fé by a railway 7 miles long, over which most of the traffic is carried.

Rosario, near the Carcaraña confluence, was a mere village of 2000 or 3000 inhabitants in the middle of the nineteenth century; now it is the second city in the State, with a population rapidly approaching 160,000. It owes its expansion partly to its position at the point where the Parana begins to bend round towards the estuary, and partly to the troublous times when Buenos Ayres had seceded from the Confederacy and the central government was stationed at Parana. In 1854 a State railway was ordered to be constructed from Rosario to Cordoba, while a large reduction of dues was decreed in favour of vessels ascending the Parana without calling at Buenos Ayres. Rosario, which is accessible to ships drawing 16 feet, immediately became the main outlet for all the inland provinces, and continues to be visited by a large number of Trans-Atlantic liners, which here

ROSARIO.

ship metals, ores, wheat, hides, alalfa grass and other produce for Europe and the United States. Its prosperity was ensured by the development of the agricultural settlements founded by Italian, German, Swiss, and other immigrants, all of whom succeeded except the English. Hence the name of Rosario bears an evil repute in England, being associated chiefly with grossly mismanaged colonisation schemes ending in utter ruin.

But the class of colonists sent out by the speculators was such as to make failure a foregone conclusion. At *Frayle Muerto*, between Rosario and Cordoba, Mr. Knight met some survivors of the ill-fated *Henley* venture, started by a number of young English gentlemen, "unsteady, fresh from school and college and regiment, without any practical knowledge of anything, who arrived at Rosario in a batch, and considerably astonished the natives by their manners and customs. Drinking, gambling and horse-racing was the order of the day; the capital they had brought with them took unto itself wings; the natives smiled at the ways of the *locos Ingleses* ('mad Englishmen')" (*op. cit.* p. 158), and the now thriving little town of Frayle Muerto has been mostly built on the spoils wrung from them by publicans and usurers.

The province of *Jujuy*, in the far north-west, takes its name from its capital *Jujuy*, founded in 1592 by Velasco on the San Francisco head-stream of the Bermejo 4000 feet above sea-level. Although lying in a fertile well-watered district yielding an abundance of agricultural produce, Jujuy has not prospered, and at present owes its importance mainly to the transit trade with Bolivia. Here the historical highway leads through the old Quichuan town of *Humahuaca* near the source of the San Francisco over the *Cortaderas Pass* (12,970 feet) to the

plateau. Below Jujuy follows the riverine port of *Oran* at the head of the navigation of the Bermejo, which is here formed by the junction of the San Francisco with the Tarija from Bolivia. Canoes and flat-bottomed boats ascend the Bermejo to this point, which is 1860 miles from Buenos Ayres. But the difficulty and tedious water traffic is now almost entirely replaced by that of the Tucuman (Great Northern) railway, which has been extended all the way to Jujuy.

The province of Salta is also named from its capital, *Salta,* which lies on the route between Jujuy and Tucuman, and carries on a brisk frontier trade both with Bolivia and Chile. The name is familiar in England in connection with the financial speculator, Jabez Balfour, who after the crash for a time escaped the arm of justice by retiring to this remote Argentine town.

South of Salta follows the old Quichuan district of *Tucuman,* with its capital of like name, founded in 1585 on a rich and highly cultivated plain at the western foot of the superb Sierra Aconquija. Tucuman is a historical city connected with many of the stirring events both of the Spanish wars and of the subsequent civil commotions, and here was proclaimed the independence of the land in 1816. Since the opening of the Great Northern Railway numerous European immigrants have settled in the district, which is covered with farm-steads, sugar and coffee plantations, while the local refineries and distilleries yield many thousand tons of sugar, and large quantities of *caña* (rum), much prized in the surrounding lands. But the glowing accounts of the natural resources of the province have to be taken with some reserve, and serious drawbacks are certainly the periodical flights of locusts, the permanent swarms of mosquitoes, and especially the dangerous *chuchu* fever, which is endemic,

being due to the foul exhalations from all the swampy depressions.

In Peruvian times the term *Tucma*, of which Tucuman appears to be a modified Spanish form, had a much wider application than at present. It certainly included the neighbouring province of *Santiago del Estero*, named from its capital, which was founded in 1563 on the right bank of the Rio Dulce in the midst of lagoons and *esteros* (" morasses "). These swampy tracts form part of the shifting bed of the river, which occasionally returns to its old channels, causing disastrous floods, as in the year 1633, when many of the inhabitants removed, some to Tucuman, others to Cordoba. Then came the Jesuits, who under almost overwhelming difficulties transformed the place to the centre of a sort of theocratic government, like that of Paraguay. After their dispersion Santiago fell to the position of a half-forgotten rural hamlet, from which it has again recovered since it has become a station on the Cordoba-Tucuman section of the Northern Railway. Its sugar industry employs a considerable number of hands, while the climate is improved as the land gets drained and brought more under cultivation.

West of Tucuman, and separated from it by the Aconquija range, lies the much larger but far less favoured province of *Catamarca*, with its capital of like name, founded in 1680 on the Rio del Valle, nearly 1900 feet above sea-level. The " valley," which is enclosed west and east by the Sierras Ambato and Ancaste, southern ramifications of Aconquija, runs out in the Salinas, that is, the salt plains which separate these mountains from the Cordoba heights. Close to the point of bifurcation, where the system culminates in the lofty peak of Aconquija, are situated the *Andalgala* copper-mines, the most

productive in Argentina. They take their name from a now extinct or absorbed Calchaqui tribe, by whom they were worked under the Incas, and afterwards forgotten, or, according to the tradition, concealed from the Spaniards by the Indians for over 300 years. Since their re-discovery about 1850, they have yielded a yearly output of nearly 2500 tons of ore, which is smelted at the *Pilciaio* works, and found to contain from 5 to 7 per cent of pure metal. Catamarca is an important station on the Great Northern Railway, by which it communicates in one direction with Cordoba and Rosario, in another with the three provincial capitals, *Rioja, San Juan,* and *Mendoza,* following in the direction from north to south along the eastern slopes of the Chilian Andes.

At the east foot of the Velasco heights lies the town of Rioja, which commands a wide prospect of one of the most fertile districts in Argentina. Wherever water can be procured, the light porous soil of the Rioja plains yields splendid crops of wheat, wine, and oranges. But the supply is limited, and it has been found impossible to greatly enlarge the area of the cultivable land by irrigation works. Moreover, the climate appears to be growing drier, and the western Rio Bermejo, which flows through the province of Rioja southwards to the Silvero lagoon, reaches that basin only during the floods. Farther north the whole district between the Velasco and Famatina ranges is highly metalliferous, abounding in gold, silver, copper, iron, and nickel to such an extent that the mountain torrents are so charged with mineral particles as to be useless for irrigation purposes. *Chilecito* or *Villa Argentina* ("Silver Town"), chief centre of the mining operations, which were begun early in the nineteenth century, is now connected by rail with the general

Argentine system, and also communicates through *Famatina* and over the mountain passes with the Chilian province of Atacama.

Mineral deposits abound also in the adjoining province of *San Juan*, whose capital of like name was founded in the year 1561 on the Rio San Juan. This copious stream

AVENIDA S. MARTIN, MENDOZA.

feeds a large number of irrigation rills, by which extensive tracts have been brought under cultivation, and then falls through two branches into the Guanacache lagoon. This basin in its turn discharges through two outlets east to Lake Silvero and south by the Rio Mendoza to the plain on which stands the city of *Mendoza*, where it is absorbed in the surrounding irrigation canals.

Mendoza, capital of the province named from it, and

formerly metropolis of the Viceroyalty of La Plata, was founded in 1560, and lasted just three centuries to the year 1861, when it was overwhelmed by one of the most tremendous earthquakes on record. Of its 15,000 inhabitants from 10,000 to 12,000 perished amid the ruins of the houses and churches, nearly all of which collapsed. But the place was soon rebuilt near the old site, and is at present one of the largest and finest cities in Argentina. "Fine public buildings, private dwellings that indicate comfort and convenience, gardens with their fruitful vines and fig-trees, walnut trees and poplars grace the public streets and walks; but above all, the pleasant promenade, more than half a mile in length, with its streams of running water flowing on both sides beneath the shade of two double rows of well-grown trees. Add to this the mountain torrent, which rolls past Mendoza along its bed of rounded stones and gravel from the mighty Cordillera, whose slopes reach almost to the city."[1]

The prosperity of Mendoza is due partly to the cultivation of the vine, and partly to its position on the great historical highway to the Pacific, which is soon to be replaced by the Trans-Andean Railway crossing the Cordillera near Aconcagua (see p. 336). This is the most direct route between Buenos Ayres and Valparaiso, and the line when completed must become one of the great commercial and international highways of the globe. Mendoza is also the centre of a rich agricultural district, and exports considerable quantities of fodder (lucerne), wine, hides, cattle, and other produce both to Chile and Buenos Ayres. As many as 50,000 head of cattle are forwarded in some years over the *Cumbre Pass* to the Chilean markets. A little to the

[1] R. Crawford, *Across the Pampas and the Andes*, p. 186.

north-west the *Uspallata Pass*, as it is also called, crosses the Andes near Aconcagua at a height of 11,512 feet.

South of Mendoza the chief centre of population is *San Rafael*, near the source of the Rio Diamante, which flows eastwards intermittently to the Rio Salado below the Bebedero lagoon. Formerly a frontier station and

SUMMIT OF USPALLATA PASS (LA CUMBRE).

outpost against the predatory Pampas Indians, San Rafael has now become a flourishing agricultural settlement, forwarding its produce by the *Planchon* and *Cruz de Piedra Passes* over the Andes to Chile. Here are also extensive coalfields, which, judging from the imperfect surveys, seem to reach all the way to the *Neuquen* district, and yield an excellent fuel, the seams being in some places from 10 to 12 or 14 feet thick.

East of Mendoza, but still for the most part within the

drainage area of the Rio Salado (Upper Colorado closed basin), lies the arid province of San Luis, which takes its name from its capital *San Luis*, founded in 1597 by Martin de Loyola on the slopes of the *Punta de los Venados*, 2500 feet above sea-level. Fruits and the vine are cultivated in the surrounding district by artificial irrigation from a reservoir containing several hundred million cubic feet of water. But the capital is already threatened with the rivalry of *Villa de Mercedes*, founded so recently as 1856 in a much more favourable position on the left bank of the Rio Quinto. Here is the converging point of several railway lines south of the Cordoba heights, and here the fertile plains are watered by several canals fed by the main stream, which flows perennially for some distance beyond Mercedes.

From this place the Trans-Continental Railway runs north-east to *Villa Nueva*, where the Great Northern branches off north-west to *Cordoba*, capital of the vast province of the same name—a kingdom in itself, abounding in all kinds of natural resources, and with a magnificently diversified area nearly as large as the whole of England and Wales combined, but with a present population scarcely exceeding that of the city of Leeds.

But in colonial times this region was secluded from the rest of the world by the policy of the Jesuits, who had made the capital a city of churches and convents, and the headquarters of their missions amongst the surrounding aborigines. Later, the southern districts continued to be exposed to the depredations of the Ranqueles and other marauding Pampean tribes, who were still scouring the plains and sweeping away the live-stock of the settlers so recently as the year 1884. Thus all real progress was retarded till the country was opened up by the development of railway enterprise

during the last two decades. Founded in 1573 by Cabrera in the upper valley of the Rio Primero, Cordoba continued to sleep away its days even long after the expulsion of the Jesuits in 1767. But since the completion of the lines bringing it into communication with the outer world its expansion has been remarkable. It already ranks for population next to Buenos Ayres and

CATHEDRAL OF CORDOBA.

Rosario, and is rapidly becoming the chief centre of trade, the industries and intellectual life in the interior of the country. The university, dating from the eighteenth century, was reconstituted on a liberal basis in 1870, and here are also several other scientific and literary institutions, notably an observatory, to which astronomers are indebted for a valuable chart of the southern constellations. But the mint, which formerly coined the gold from the neighbouring uplands, has been

closed since the mines have ceased to be profitably worked.

The attempts made to suppy Cordoba with water for irrigation and general purposes by constructing a huge dam across the bed of the Rio Primero have not been entirely successful, and nearly caused the destruction of the city in 1890 when, after a heavy downpour, a great part of the contents of the reservoir escaped and swept away several hundred houses. But, although greatly reduced in size, the artificial lake is still 70 feet deep, and contains 2000 million cubic feet, sufficient for all local wants, and for the irrigation of over 100,000 acres.

Amongst some of their neighbours, the people of Cordoba, mostly half-breeds of a somewhat ugly type, have the reputation of being the greatest thieves and murderers in South America. But the Cordobans retort by accusing those of Santiago and Santa Fé of all the crimes under heaven; and so it is generally throughout the republic. But the experience of most travellers is that all alike are rather a kindly, hospitable people, usually peaceful and well conducted. "Organised bands of banditti, as they have in Mexico, are quite unknown here, unless it be in revolution times, when every South American becomes more or less of a brigand for the nonce. It is, indeed, creditable to these poor half-breeds that, left to themselves as they are, they should be so law-observing and orderly. Mule-trains laden with silver dollars often make enormous journeys here without an armed escort being deemed necessary to accompany them. If the people that inhabit these wild steppes were of Anglo-Saxon blood, it strikes me that this would hardly be the case."[1]

[1] Knight, vol. i. p. 199.

Buenos Ayres, one of the great cities of the New World, and capital of Argentina, but not of the State named from it, was founded in 1535 by Diego de Mendoza on the south side of the Plate estuary, at the point where the monotonous shore line is indented by a little pampean creek appropriately called the *Riachuelo* ("Brooklet"). But the surrounding plains were at that time held by the Querandi, a powerful branch of the Pampas or Gennaken Indians, who resented the intrusion of the whites in their territory, and after a fierce struggle compelled them to abandon the settlement in 1542. Owing to the hostility of the still more warlike Charruas, no attempt could be made to gain a footing on the north (Uruguayan) side, while the safety of the inland stations above the Parana delta made the possession of a strong trading-place in the estuary a matter of urgent necessity. Hence the Spaniards returned in 1580, and under the able command of Juan de Garay effectively established themselves on the Riachuelo.

Then the military difficulties were followed by fiscal troubles, caused by the jealousy of the Cadiz and Seville merchants, who enjoyed a monopoly of the colonial trade by the Colombian and Peruvian routes. Through their influence the central government was induced to issue the famous decree that all merchandise destined for the Plate estuary should be forwarded by the way of Peru over the Cordilleras and down the Paraguay river. No doubt this absurd regulation was partly thwarted by the contraband trade, which inevitably sprang up in the Plate river; but the progress of the colony was greatly retarded till the year 1776, when the whole of the Argentine region was divorced from its unnatural commercial and political dependence on Peru, and constituted a separate Viceroyalty under the Crown. Since

then Buenos Ayres, despite endless political troubles, internal strife, financial catastrophes, and epidemics, has continued to prosper, thanks more to its geographical position at the entrance of the vast Parana-Paraguay basin than to any specially favourable conditions of soil or climate. Indeed the *Puerto*, as it was called by its founder, was no "port" or haven, but an open roadstead in shallow water exposed to fierce south-easterly gales, and only in recent times transformed to an artificial port by the construction of docks, basins, breakwaters, and other extensive harbour-works.

The city, laid out in the usual chess-board plan, presents little to arrest attention beyond some really fine public buildings, conspicuous amongst which are the federal Houses of Parliament, the Post Office, Custom House, Opera House, Cathedral, several banks and railway stations. The terminus of the Great Southern line is quite a palatial structure, with marble halls and staircases, sculptures, carvings and a noble frontage. But for the excellently managed tramways radiating in all directions, traffic would have been difficult along the formerly ill-paved and ill-kept thoroughfares. "Ruts and hollows in which one could lie down and disappear abound. Several of the roads have never been metalled, and are still mere earthen tracks. In dry weather they are inches deep in dust, and when heavy rain comes on, they are a deep sea of liquid mud."[1]

This was in 1887, and since then great improvements have taken place. The streets are now paved with asphalt, wood, and quarried stone, and a great drainage system has also been carried out, thanks to which the former visitations of yellow fever have almost disappeared, for the climate is not naturally insalubrious,

[1] Dr. E. R. P. Edgcumbe, *Zephyrus*, p. 181.

MAYO AVENUE, BUENOS AYRES.

though the mortality is still rather high. The water required for general purposes is brought by an aqueduct and a very long tunnel from the estuary five miles higher up, where it is quite fresh; but the supply is insufficient—about 15,000,000 gallons daily—and has to be supplemented by numerous Artesian wells, some of which are fed by infiltrations from the Parana, and appear to be inexhaustible.

Buenos Ayres, capital of the Republic, ceased to be the capital of the province in the year 1882, when the provincial government was removed to *Ensenada*, thirty miles lower down the Plate estuary. To understand the cause of this change, it should be stated that, after joining the confederacy in 1860, Buenos Ayres, the largest and by far the wealthiest and most populous of all the united provinces, became for a time the dominant power in the republic. She was not only an *imperium in imperio*, but aspired to the position of arbitrator and controler of the destinies of the whole country. But finding her supremacy threatened by the steady growth of the other provinces, and her unconstitutional action resisted by the National Government, she made an abortive attempt to secede from the confederacy in 1880, and again set up for herself as before the year 1860. After a short and half-hearted struggle the revolt collapsed, the city of Buenos Ayres was constituted a federal district, like that of Colombia (Washington) in the United States, and the seat of the provincial administration transferred in 1882 to Ensenada, which was then renamed *La Plata*.

Then was witnessed a remarkable transformation. The whole energies of the province were concentrated on the effort to create a new capital worthy of its unchallenged position, as the most enterprising and in-

MUNICIPAL BUILDINGS, LA PLATA.

fluential member of the confederacy, and in an incredibly short time the obscure village of Ensenada was changed, as by the magician's wand, to a stately seat of government, with public buildings of every description—a complete range of departmental structures, legislative chambers, law-courts, treasury, official residences, railway stations, and so forth—all planned and executed on quite a magnificent scale. Harbour works have also been designed and partly carried out to attract some of the ever-increasing trade of the estuary, while the interests of science and letters have been amply provided for by a university, a well-equipped observatory, and the noble *Museo de la Plata*, where is already housed one of the richest zoological and archæological collections in the world. In 1899 the population was estimated at 70,000, and its enthusiastic citizens already foresee the time when La Plata will rival the great federal capital itself in size and opulence. In truth, there would appear to be ample room for two such cities as Buenos Ayres, on the vast waterway which washes the shores of an administrative department 5000 square miles larger than England and Wales together, and gives access to one of the great fluvial basins of the New World.

In the Patagonian territories south of Buenos Ayres —Rio Negro, Neuquen, Chubut, and Santa Cruz—there are strictly speaking no urban groups, but only small and struggling agricultural settlements, such as *Carmen* on the Rio Negro, *Chos-Malal*, *Norquin*, and *Junin de los Andes*, in the upland pastoral districts at the foot of the Cordillera; or else little fishing-stations, such as *Port Desire*, *St. Julian*, *Santa Cruz*, and *Gallegos*, awaiting the development of the interior to become busy seaports. Of all these places the most interesting to English readers is the Welsh colony of *Port Madryn*, founded in 1865

on the nearly land-locked *Golfo Nuevo*, and connected by rail with the settlements of *Trelew* and *Rawson*, on the left bank of the Lower Chubut, a little farther south. The climate is cold and the soil not over-fertile; but

MUSEO DE LA PLATA.

there is plenty of water obtained by capturing the flooded stream of the Chubut, and the hard-working settlers possess the qualities of patience and endurance. So there is hope that this little "New Wales" may establish itself permanently on the bleak seaboard of South Patagonia. But it can scarcely any longer be called a "Welsh

colony." Not more than half of the inhabitants are of that nationality, and the finest warehouses are now owned by Italians. In 1903 over 40,000 acres were under wheat, and the live stock (sheep, cattle, and horses) numbered about 60,000.

Historic Retrospect

For several decades after the declaration of independence at Buenos Ayres in 1810, Argentina, which at that time included the Banda Oriental, that is, the present republic of Uruguay, constituted a number of semi-independent states, with little political cohesion, and no universally recognised central government. This was, moreover, a period of disastrous foreign wars, of internal strife, anarchy, and general political confusion, during which nothing was done to forward the common interests of the land. Scarcely had the Spaniard disappeared when Buenos Ayres plunged into an unsuccessful war with Paraguay (1811).

Then the Banda Oriental, Santa Fé, Corrientes, Entre Rios, and Cordoba declared themselves an autonomous commonwealth under Artigas, "Protector of the Free" (1814). In 1828, after the execution of Dorrego, Governor of Buenos Ayres, a struggle broke out between the unionists and the federalists. The latter prevailed, but party words had lost their meaning, and nobody played the part of a despotic unionist more thoroughly than the "federalist," Rosas, who, despite of endless revolts, and the intervention of England and France, maintained one of the most oppressive dictatorships recorded in history for a period of twenty years. Even after his overthrow and escape on board an English vessel (1852) the intestine convulsions were followed by

the long and memorable war of the Allies with Paraguay, complicated with local revolts.

Material Progress—Railway Enterprise

But the expulsion of Rosas may, on the whole, be regarded as the turning-point in the history of Argentina, which after that event entered on a period of comparative rest, which has lasted to the present time not seriously broken except by the Buenos Ayres episode and financial troubles due to over-speculation, and a somewhat reckless expenditure of the public funds and foreign loans. Nevertheless substantial progress has certainly been made, thanks to the steady increase of the population both by immigration and a relatively high birth-rate, and to the stimulus given to trade and agriculture by the construction of roads, railways, and telegraphs. Some of the railways may have been built at an extravagant outlay—over £20,000 per mile where £4000 or £5000 should have sufficed—but the fact remains that nearly 12,600 miles have been completed (1906), and so planned that all the provinces and almost every important town in the country already enjoy the advantage of direct communication by rail with the capital. As in many parts of North America the locomotive has often preceded the carriage roads, and the construction of railways has been found more easy and economical in extensive alluvial tracts, where no materials are available for road-building. In 1906 the total capital invested in railway enterprise amounted to £125,000,000, while the gross receipts exceeded £16,000,000 and the expenses £9,624,000, and the passengers carried, 32,500,000.

Agriculture and Stock-breeding

Argentina is at present almost exclusively an agricultural and trading country, as shown by the fact that in 1906 the mineral exports had fallen to the insignificant sum of £54,000, while those derived from the land (corn, cattle, hides, wool, etc.) exceeded £56,000,000, to which should be added £1,200,000 of forest products. Moreover, nearly all the industries—flour-mills, wine factories, distilleries, breweries, and sugar-mills—are directly concerned with such agricultural produce as the corn, vine, and sugar-cane crops. Even these more or less primitive industries, and tillage itself, play quite a subordinate part compared with stock-breeding, which must long continue to be the chief source of national wealth. Thus (1906) not more than 32 million acres were under cultivation, while the actual extent of arable land is estimated at 240 millions.

But most of this vast area is useless for tillage, owing to the deficient rainfall, and the limited supply of running waters available for irrigation purposes. Hence the greater part of the land remains under grass, and while husbandry in the strict sense of the term is slowly developed, there seems to be no limit to the capacities of the country for sheep and cattle farming. In 1898 the stock of sheep was returned at over 80 millions, of cattle at 22, horses nearly 5, and other animals 4 millions, and in the year 1906 animals and their products were exported to the value of £25,000,000, while the exports of farm produce, such as wheat and maize, scarcely exceeded £31,000,000. In the general movement of the foreign exchanges, the balance of trade is greatly in favour of the United Kingdom, whose exports to Argentina, chiefly textiles and hardware, were

valued in 1906 at £19,428,000 compared with imports £23,800,000 in the same year.

Government—Political Situation

The Constitution of Argentina dates only from 1853, the year after the expulsion of Rosas, and its character is somewhat indicated by the change then made in the official designation of the country, which was formerly known as the "Provincias Unidas del Rio de la Plata," but is now simply the "Republica Argentina." In other words, despite the apparent triumph of the federalists in the battlefield, the unionist or centralising principle has been adopted as the basis of the present Constitution, which is somewhat closely modelled on that of the United States. The executive is entrusted to a President elected for six years by representatives of the fourteen provinces, equal to double the number of senators and deputies combined. A Vice-President, elected in the same way, holds the office of Chairman of the Senate, but enjoys no political power, whereas the President is *ex officio* commander-in-chief of the troops, and also appoints to all civil, military, and judicial offices. Neither is re-eligible, and both must be natives of Argentina, and Roman Catholics.

The legislative functions are exercised by a National Congress comprising a Senate and a House of Deputies. The Senate, numbering thirty, that is, two for each of the fourteen provinces and two for the capital, are returned by the legislatures of the several provinces, and by a college of electors in the capital. Since 1898 the deputies are elected for four years, in the proportion of one for every 33,000 inhabitants, one-half retiring every two years, while one-third of the Senate is renewed

every three years. The Ministry, which is appointed and controlled by the President, comprises eight "Secretaries of State," one each for the Interior, Foreign Affairs, Finance, War, Justice, Agriculture, Marine, and Public Works. All these functionaries are subsidised, the President receiving £14,000, the Vice-President £7000, each of the Secretaries £1800, and each member of Congress £3000 per annum.

Although called "provinces," the federal divisions are really self-governing States, whose constitution is almost identical with that of the United States. The governors enjoy extensive powers, in the execution of which they are independent of the central authorities. Nor are they appointed by the President, but elected for terms of three and four years by the people, who also elect their own legislative assemblies, and generally enjoy a large measure of autonomy, even to the extent of contracting internal and foreign loans on their own responsibility. But by the federalisation of the old Buenos Ayres municipality, in which are concentrated one-sixth of the whole population and over two-thirds of the foreign exchanges, the hands of the central government have been greatly strengthened, and the ambitious aspirations of the province of Buenos Ayres permanently checkmated, so that the several provincial divisions can be trusted with the entire management of their own affairs, without risk to the stability of the National Government.

It is doubtful whether any serious revolts will again take place, because the self-governing provinces have been deprived of any motive, and Buenos Ayres of the power, to rebel or secede. But military intrigues and local insurrections are always possible amongst such inflammable populations, and many risings did actually take place in Santiago, Corrientes, Catamarca, Tucuman,

Santa Fé, and in Buenos Ayres itself during the financial crisis of the years 1890-94.

Religion—Education—Defences

As might be inferred from the fact that the President must be a Roman Catholic, Catholicism is recognised by the Constitution as the State religion. Nevertheless absolute tolerance of all other beliefs prevails both in principle and in practice throughout the republic. Even the Jews are unmolested, and the flourishing agricultural settlement founded by the late Baron Hirsch as a refuge for those driven from Russia by the Anti-Semitic wave of persecution, is allowed the free exercise of its religion, as well as the enjoyment of religious instruction in its own schools. It may be mentioned that this interesting philanthropic experiment has so far been fairly successful, and the Jewish settlers have here shown that they can be good farmers as well as traders and bankers. In 1898 the colony, founded in 1891, had a population of 8000 Russian Jews, who had brought 80,000 acres under cultivation (chiefly wheat and maize), and owned about 15,000 head of cattle and horses. The settlements are not contiguous, but scattered over different parts of Santa Fé, Entre Rios, and Buenos Ayres, and are under the somewhat strict control of the Society appointed to administer the original capital of £2,000,000.

Primary education is absolutely free, secular and compulsory for all children between six and fourteen years of age. The elementary schools are provided for by special taxes under the Education Acts, supplemented by large grants from the National Government. As much as £2,000,000 were applied in 1905 to the support of about 5250 schools with a total attendance

of nearly 409,000. Secondary and the higher education are provided for by sixteen Government lyceums, thirty-five normal schools, several technical institutions, and five universities,—Buenos Ayres, La Plata, Cordoba, Santa Fé, and Parana; these last with faculties of law, medicine, and engineering, and a collective attendance of about 3000.

Besides the External Debt and other public liabilities of over £83,000,000 in 1908, the Provincial debts fall little short of £30,000,000, including arrears of interest, and the Municipal debts to about £3,000,000. Thus the total indebtedness exceeds £160,000,000, a heavy burden for a population of not much more than 5,500,000. Yet nearly £6,000,000 are devoted to defensive purposes. The land forces comprise nearly 20,000 effectives of all arms, and a national guard of 480,000, most of whom now receive military training. With a view to possible hostilities with Chile over the boundary question, the navy was strengthened a few years ago, and in 1908 comprised 2 battleships, 7 cruisers, 14 torpedo-boats, and 4 destroyers, with a personnel of from 5000 to 6000 men. The navy is to be further strengthened in 1909-10 by 2 Dreadnoughts and 18 destroyers and torpedo-boats.

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CHAPTER XII

URUGUAY

Extent, Area, Population—Physical Features—The Cuchillas—Hydrography—The Uruguay River—Climate—Flora—Fauna—Inhabitants—The Charruas—The Gauchos and Uruguayans—Topography—Historic Retrospect—*Railway Enterprise*—Resources—The Meat Industries—Government—Education—Finance.

Extent, Area, Population

URUGUAY, smallest of the South American States, has at least the advantage of possessing well-defined and uncontested frontiers. All boundary questions have long been settled, nor could any have arisen except on the north side, where this fiery little republic is conterminous with the Brazilian province of Rio Grande do Sul. On the west the line of demarcation towards the Argentine province of Entre Rios follows the course of the Uruguay river from 30° S. lat. to the Parana delta, while the southern and eastern shores are washed by the waters of the Plate estuary and of the Atlantic as far as the Brazilian maritime district of Albardas de Silveira, and farther north by the Lagoa Mirim to the mouth of the Rio Jaguarão. This river serves as the frontier towards Brazil nearly to the Upper Rio Negro valley, beyond which the line coincides with the crest of the Serra

Santa Anna, and then with the course of the Rio Quaraim (Quareim) to its confluence with the Uruguay.

As thus delineated, Uruguay has an area of a little over 72,000 square miles, with a population which, in the absence of any official census, was estimated in 1906 at 1,103,000, distributed over the nineteen departments as under:—

Departments.	Area in sq. miles.	Pop. (est. 1906).
Monte Video	256	308,454
Canelones	1,833	98,014
Colonia	2,192	59,000
Salto	4,863	51,661
Soriano	3,560	44,487
Paysandu	5,115	52,398
San José	2,687	48,671
Florida	4,673	52,018
Durazno	5,525	48,418
Cerro-Largo	5,753	42,401
Tacuarembo	8,074	44,173
Minas	4,844	43,727
Rocha	4,280	35,582
Maldonado	1,584	31,419
Artigas	4,392	32,805
Treinta y Tres	3,686	30,193
Rivera	3,790	28,831
Rio Negro	3,269	36,925
Flores	1,744	18,868
Total	72,110	1,103,040

As in most of Argentina, the aborigines never were numerous, and consisted generally of fierce wild tribes, such as the Charruas, who, like the prairie Indians, mixed little with the white intruders. Few if any full-blood natives have survived the racial wars, which were carried with little intermission far into the eighteenth century. Hence, with the exception of a few groups of half-breeds resembling the Argentine Gauchos, and called by that name, though of less wild and restless habits, the present

inhabitants of Uruguay may be regarded as of tolerably pure European descent. Nearly a fourth are even relatively recent arrivals—Spaniards, Italians, French, and especially Basques from both sides of the Pyrenees, while the rest are sprung from the early Spanish and Basque settlers. The Teutonic element has never been largely represented, and the English and Germans form but a slight percentage of the present inhabitants of Uruguay, where Spanish is the general medium of intercourse, understood if not spoken by all classes.

Physical Features—The Cuchillas

From the orographic standpoint Uruguay belongs, not to the Argentine pampas formation but to the Brazilian mountain system. Like the Andean Cordilleras, the Brazilian uplands fall gradually southwards, and in Uruguay some of the ranges scarcely exceed 2000 feet in height. But their geological connection with those of South Brazil is recognised even in the popular nomenclature, which calls these ranges not sierras but *cuchillas*, that is "knives," although the crests are not nearly so sharp or jagged as those of Rio Grande do Sul. In fact they are for the most part rather gently rounded summits, which, however, terminate in many places in bare, rocky heights rising above the zone of herbaceous vegetation. The whole surface of the land is intersected and broken by these irregular cuchillas, where it is impossible to detect any uniform system or general trend. Thus the *Cuchilla de Haedo*, which traverses the north-western districts in a south-westerly direction, is separated by the *Cuchilla de Malhajar*, running due east and west, from the *Cuchilla Grande*, which wanders in zigzag fashion over the southern and central departments, throwing off spurs

north-westwards to the Rio Jaguarão, and southwards to the coast between Monte Video and Maldonado. Here the *Sierra de las Animas* terminates seawards in several bold headlands, of which Monte Video is the most conspicuous.

In the north the prevailing formations are granites and gneiss, often underlying old eruptive matter, and here the land is mineralised to some extent with auriferous veins, lead and copper deposits, but apparently nowhere very abundantly. Along the banks of the Uruguay and some other rivers occurs the so-called *piedra china*, a flinty gravel of unorganic origin, besides great quantities of rough agates looking like large flints. These are largely exported to Germany, where they are manufactured into innumerable little pebble boxes, letter-weights, and other fancy objects. Here also is met another natural curiosity, the *cocos de mina* ("mineral coconuts"), hollow crystalline clusters, which occasionally explode and are then said by the natives to have ripened. Such crystal pebbles, often beautifully coloured, are found in multitudes, especially in the rocky bed of the Quaraim, where they may be picked up in handfuls, when the river runs dry. In the grassy argillaceous plains everywhere intersected and limited by the Cuchillas, are found embedded the remains of the Megatherium and other extinct animals, presenting the same types as those of the Argentine Tertiary beds.

Hydrography—The Uruguay River

Apart from a few insignificant coast-streams, such as the *San José*, which enters the estuary at Monte Video, all the running waters find their way either to the *Lagoa Merim* or to the left bank of the *Uruguay*. The Merim

basin, which sends its overflow through the Rio S. Gonzalo to the Lagoa dos Patos in Brazilian territory, receives nearly all the eastern drainage of the Cuchilla Grande mainly through the *Rio Cebollati*, with its tributaries, the *Rios Gutierra, Ulimar, del Parado*, and a few others. None of these are navigable, and are fringed along their lower courses by sedgy marshes, which during the floods are transformed to shallow lagoons.

By far the largest affluent of the Uruguay is the *Rio Negro*, which, with its numerous ramifications—*Tacuarembo, Malo, Yi, Grande*, and others, drains about half of the whole territory. Rising within the Brazilian frontier it flows for about 280 miles between the Cuchillas Haedo and Grande south-westwards to the main stream at Soriano. It is navigable above the confluence as far as Mercedes, and a scheme of canalisation has been proposed, which if carried out would enable large vessels to ascend as far as the Tacuarembo, besides supplying the irrigation waters required to bring large tracts of prairie under cultivation.

The Uruguay, from which the republic takes its name, takes its rise in the Brazilian coast range known as the Serra Geral, within 50 miles of the Atlantic. Its upper course, formed by the junction of the *Pelotas*, the *Santa Anna* and the *Marombas*, flows through South Brazil nearly due west to its junction with the *Peperi Guazu*, where it bends round to the south-west and south, and becomes the frontier stream between Brazil (Rio Grande de Sul) and Argentina (Misiones, Corrientes, and Entre Rios).

Below the confluence of the *Ibicuy Guazu*, largest of its Brazilian affluents, the stream, here flowing nearly due south, leaves Brazilian territory, and for the rest of its course forms the boundary between Uruguay and Argentina. At Salto, the "Falls," the channel is studded

with rocks and reefs, permanently arresting the navigation for large vessels, and these obstructions are followed 12 miles lower down by the *Salto Grande*, the "Great Falls," which, however, are falls only at low water. They appear to take their name, not so much from their size as in contrast to the *Salto Chico*, or "Little Falls," which occur 9 miles farther on, and offer but slight impediment to ordinary river craft. In the lower reaches below Fray Bentos the Uruguay assumes the aspect of a lake, throwing off lateral branches to the Parana delta, and entering the head of the Plate estuary, a broad stream from 6 to 10 miles wide. Here the right bank is low and periodically flooded, while the steep cliffs and bluffs on the opposite side rise well above the highest inundations. With a length of about 960 miles, and an average width of half a mile, an official report for 1905 shows that the ocean navigation of the Uruguay extends to below the San Francisco bay, and the coast navigation up the river to Concordia, the yearly traffic in the Argentine ports being about 350,000 tons. But it is of little use for navigation between Salto and Santa Rosa, where there is a total fall of 150 feet in about 100 miles. During the annual floods, which occur generally in the months of August and September, and are caused by the heavy rainfall in the Santa Catharina, Rio Grande do Sul, and Misiones uplands, all the lower reaches are laid under water on the Argentine side, while the rise is as much as 50 feet higher up, where the current is contracted, as between Concordia and Salto.

Climate

Notwithstanding its relatively small extent, Uruguay, owing to its maritime position, comprises two climatic

zones—an oceanic and an inland. In the former, which is generally more equable, the seasons are less sharply distinguished, the summer heats being less intense, the winters less severe on the seaboard than in the interior. In the northern districts and on the central plains the heat is extremely oppressive during the months of December, January, and February, while in June and July the glass often falls 5° or 6° below freezing-point. But for the whole country the normal range of the temperature is limited to about 36° to 100° Fahr. The climate may thus be described as warm, or sub-tropical, which answers fairly well to the lie of the land between 30° and 35° S. lat. The chief drawbacks are the frequent storms, and the sudden shifting of the temperature caused by the south-western *pamperos*, which, unchecked by any mountain barriers, blow with great fury over the whole land.

From the standpoint of European colonisation it is important to note the differences of temperature under corresponding latitudes in both hemispheres. Thus Monte Video is much cooler than Biskra, and Salto than Alexandria, which is all in favour of Uruguay, where the Mediterranean settlers thrive well and even better than in the home-lands. Travellers never fail to notice the robust constitution, the broad chests and muscular frames of the Uruguayan drovers and "cowboys" employed on the ranchos and in the tinned-meat factories, and in all these respects they are certainly far superior to the Berbers, the Egyptians, and South Europeans. Of course in comparisons of this sort the question of diet cannot be overlooked. But if the easterns have perhaps too little, the westerns may be said to have too much meat—meat and nothing but meat, fresh or jerked, from one end of the year to the other.

In general there is sufficient moisture for stock-breeding, but not for tillage, except in some favoured districts. The annual rainfall no doubt averages about 40 inches, but it is very unequally distributed both as to localities and seasons. By far the greater portion of the discharge is brought by the so-called *pampero sucio* ("dirty pampero"), which prevails in the summer months, and is accompanied by torrential downpours. "The sheets of water, that come down perfectly straight all through the day and night without a break, are accompanied by equally continuous thunder and lightning, which seem to work their way round the heavens and to box the entire compass. The thunder is one unceasing muffled roll, out of which burst sudden fierce claps of deafening violence; the lightning playing meantime almost uninterruptedly at every point of the horizon, and leaping forth now and then into a great scorching flame, which for a moment lights up the whole world with a lurid blue and yellow. The darkness, too, almost equals that of a dense London fog; while the heat seems to increase rather than to yield to the storm, and one sits in a prolonged vapour-bath, with the most trying sense of physical prostration and depression of spirits."[1]

Flora

Herbaceous growths prevail to such an extent over all other vegetable forms, that the greater part of Uruguay may be described as a continuation of the Argentine pampas, the chief difference being that the land is more broken and hilly, while the grasses are more stunted, or at least shorter and sweeter. Even the unsociable *ombu* (*Ficus ombu*), the really characteristic

[1] *The Great Silver River*, p. 130.

tree of the Argentine plains, from which, however, it has mostly vanished, forms also a conspicuous feature of the Uruguayan landscape, thriving where no other tree will take root, and affording a grateful shade to the scattered farmsteads. In recent years the resemblance between the two floras has been increased by the presence of the Australian eucalyptus, which has been successfully introduced on both sides of the Plate estuary. Trees, such as the willow and poplar, the *inga* (a hardy and leafy mimosa), besides the *tacuara* (a bamboo of vigorous habit) fringe the river-banks, while a distinctly arborescent vegetation begins to make its appearance towards the Brazilian frontier. Here flourish several species of palm, especially the *yataï* (*Cocos yataï*), the araucaria and some other forms characteristic of the Brazilian campos and selvas.

But herbage remains the distinctive feature of the Uruguayan flora, and of such excellent quality are the natural growths that the whole region has been described as an ideal grazing-ground. Throughout the central and southern departments little is to be seen except endless ranges of grassy hills, "splendid downlands rolling on in great billows league after league, and bearing a marked resemblance to our own Dorset downs at home, only cast in a rather larger mould, the finest pasture-land simply waiting for men to come and run up fences, and needing absolutely nothing more to make the best of grazing farms. Elsewhere one hears of the toil of settlers in clearing their land, labour which in many parts means an initial cost of from £5 to £15 an acre. But on the rolling down of Uruguay man is called upon to do nothing, for the land is provided ready for him, with the best possible permanent pasturage laid down for his use. On these endless grassy downs there are no trees, save

just along the gullies of the little streams, and about the *estancias* (farm-steads), which dot the plains at intervals of about every three miles."[1]

Fauna

As in long settled regions, such as Great Britain and China, most of the wild fauna has already disappeared from Uruguay, and given place to domestic animals—chiefly horned cattle, sheep, and horses—all introduced by the white settlers and now covering the whole land in countless multitudes. Even the rhea has almost ceased to roam the plains in the wild state, and is now for the most part confined within enclosures, forming "ostrich farms," like those of South Africa. Nevertheless the indigenous fauna, which comprised both Argentine and Brazilian types, is still represented in the northern woodlands by the howling monkey and by caymans in the upper waters of the Uruguay, while the rattle-snake still lurks in the rocky recesses of the southern seaboard. Here also is met a land crab of burrowing habits, like the *Cancer ruricola*.

It is noteworthy that European poultry do not thrive in Uruguay, where several species of the native avifauna still survive in considerable numbers. Large flocks are seen of the widely-diffused *teru-tero*, a handsome bird of the lapwing family, but disliked by sportsmen as "a common informer," warning other game of their approach. As on the pampas, every little eminence is surmounted by the tiny burrowing owl, blinking away in the full blaze of the sun; large tawny-winged vultures keep silent watch on the wide-spreading branches of the solitary ombu, and the beautiful white heron lends animation to the scene in the flooded marshy depressions.

[1] *Zephyrus*, p. 153.

Inhabitants—The Charruas

In pre-Columbian times Uruguay was occupied by several distinct ethnical groups, all living in a state of nature, or at least at a low stage of culture little removed from sheer savagery. Such were the *Minuanos*, the *Boanes* (*Bohanes*), *Yaros*, and *Chanas* (*Chanases*), some of whom were, no doubt, of Guarani stock, but others, perhaps the majority, were either allied to the Pampean Querandies, or else distantly connected with the Parana and Gran Chaco natives. All these were confined to the western and northern districts—the banks and islands of the Uruguay and the wooded tracts towards the present Brazilian frontier—while the rest of the land was roamed by the numerous and powerful *Charrua* nation. The Guarani tribes, for the most part of a mild and gentle disposition, were soon reduced and absorbed by the Spanish settlers, or else exterminated by the Charruas, who were dominant in the whole region from the Atlantic to the Uruguay. All the riverside groups, however, are not yet quite extinct, and in his monograph on the Chanas, the Argentine ethnologist, Lafone-Quevedo, locates the surviving Yaros east and west of the mouth of the Uruguay, and some Chanas south of the Parana delta, and also shows that these Chanas were not of Guarani speech, as hitherto supposed.[1]

That the Charruas were fierce nomads, and perhaps even cannibals, like many of the Brazilian coast tribes, appears from the record of their very first conflict with the whites. When Juan Diaz de Solis revisited the Plate estuary in 1515, he landed with some of his followers at the mouth of the Rio Martin Chico on the north side, and here the whole party were cut off, killed, and, as

[1] *Los Indios Chanases y su Lengua*, Buenos Ayres, 1899.

was reported, eaten by a band of these natives, who are described by all the early Spanish and Portuguese writers as amongst the most cruel and ferocious of the South American aborigines. But nobody questioned their valour and dauntless love of independence, disputing every inch of their territory, first with the rude weapons of the tribe—bow and arrows, club or stone axe—and afterwards mounted on the horses and with the fire-arms they had wrested from the intruders. In the struggle, prolonged over three centuries, the whole nation perished, preferring death to loss of freedom.

About the year 1750 the Charruas had already been driven north of the Rio Negro, where they formed an alliance with the Minuanos from the Parana, and were thus enabled to continue a guerilla warfare which Azara declared had cost the Spaniards more blood than the conquest of Mexico and Peru. They were finally vanquished and all but exterminated in 1831, when a few of the survivors were sold to an itinerant showman, and exhibited like wild beasts in European menageries. The last full-blood Charrua, one of these captives, is stated to have died in a Paris hospital towards the middle of the nineteenth century. It is, however, asserted by M. de Saint Adolphe, that at an early date some of their bands, harassed by the Paulistas, who enslaved all they could lay hands on, took refuge in the forests of South Brazil, "where a few scattered groups are still met."[1]

The Gauchos and Uruguayans

In any case there would appear to be a strain of Charrua blood in the Uruguayan Gauchos, if not in many of the Uruguayans themselves. Thus might be

[1] *Op. cit.* vol. i. p. 272.

explained their great physical strength, their too often misapplied energy, and especially the almost incredible cruelty and ferocity displayed first in the war of independence, and afterwards during the interminable political conflicts of the *Colorados* and *Blancos*, "Reds and Whites." On the left bank of the Uruguay, between Paysandu and Salto, travellers notice a conspicuous bluff or headland called the *Mesa de Artigas*, and are told that it is so named from General Artigas, "Founder of the Uruguayan Nation," who, in 1814, during the war of independence had his captives sewn up in ox-hides and rolled down the cliff side at this spot into the swirling stream below. Afterwards this inborn spirit of savagery was fomented not only by the civil strife and wars with Brazil and Argentina, but also by the meat industry, which has transformed the whole land to a huge shambles, "making the air hot and heavy with the smell of blood, and men callously unconcerned at its sight. One of the ugliest traits of the uneducated native of these countries is his perfect indifference to the sufferings of the brute creation; his comparative disregard of human life is, with such a training, not unintelligible."[1] Nevertheless, with the cessation of the aimless faction fights an improvment has set in; the people have acquired more restful habits, and even in Monte Video, centre of countless political disturbances, observers already notice a less restless and more dignified bearing in the upper classes.

Topography—Historic Retrospect

In Uruguay nearly all the groups of population except Monte Video and one or two other seaports or

[1] Rumbold, p. 153.

mining-stations are directly connected with the meat industry. Hence they present the aspect rather of huge factories of a very rough and even repulsive character than of towns in the ordinary sense of the term. Hence also most of these places — Fray Bentos, Mercedes, Paysandu, Salto—are situated either on the Uruguay or on the navigable parts of the Rio Negro, while the

MONTE VIDEO.

interior, being mostly given up to stock-breeding, is almost destitute of large towns. In the whole country there are scarcely a dozen places with over 5000 inhabitants, as shown in the subjoined table, where the populations are estimated for the year 1907 :—

Monte Video	310,000	Villa de Melo	8,000
Paysandu	26,000	Rocha	8,000
Salto	15,000	Santa Lucia	7,000
Mercedes	11,000	Fray Bentos	7,000
San José	10,000	Maldonado	6,000

Monte Video, which for a time gave its name to the republic of which it is the capital, is of relatively recent origin, yet already one of the great cities of the Southern Continent, with a population (1899) of over a quarter of a million, or nearly one-third of all the inhabitants of the State. Its convenient position near the entrance of the Plate estuary explains a commercial prosperity which could be arrested neither by political troubles, nor epidemics, nor sieges, one of which, lasting for nearly ten years (1842-51), has earned for Monte Video the title of the "New Troy."

The history of this place is the history of the *Banda Oriental*, the name by which the Uruguay lands were formerly known, and are still often called by the surrounding peoples. The expression, meaning "East Side," has reference to the position of this region east of the Rio Uruguay relatively to the *Banda Occidental*, "West Side," that is the Argentine lands proper, on the opposite side of the river. But owing to the determined hostility of the warlike Charrua aborigines, the Banda Oriental remained unsettled till the year 1680, when the Portuguese founded the military station of *Colonia* (*Colonia-do-Santissimo-Sacramento*) opposite Buenos Ayres, with the view of rounding off their southern possessions by the annexation of the *Estado Cisplatino*, as they called this region. The very next year the place was seized by a Spanish expedition from Buenos Ayres, and all the settlers—men, women and children—put to the sword. From that time till the Revolution the Banda Oriental continued to be hotly contested by the two rival powers, and Colonia was not finally abandoned by Brazil till 1827, when it was occupied by the Monte Videans.

Monte Video itself had been founded in 1726 by the Spaniards for the avowed object of outflanking the

COLONIA.

Portuguese of Colonia, and remained little more than a military outpost of Buenos Ayres till the year 1778, when it entered on a period of great commercial development as a free port, thanks especially to the abolition of the commercial monopoly of Cadiz. Settlers were now attracted from all quarters, and by the close of the eighteenth century Monte Video had become the largest trading-place in South America.

Then ensued over half a century of colonial and foreign wars, the capture of the city in 1807 by the English, who, however, were obliged to withdraw after the defeat of General Whitelock at Buenos Ayres; the expulsion of the Spaniards in 1815; the occupation of the place by the Portuguese in 1817, followed by the incorporation of Cisplatina in the Brazilian Empire (1824); the overthrow of the imperialists (1827), and the recognition of the independence of Uruguay both by the Brazilians and Argentines by the treaty of Rio de Janeiro (August 1828).

But this treaty, brought about by the intervention of England, was displeasing to the Argentines, who had always looked on the Banda Oriental as belonging politically to the Plate domain, and had co-operated in the expulsion of the Brazilians, not in order to establish its autonomy, but to effect its reunion with the Confederacy. On the accession of Rosas to power Monte Video became the refuge of those opposed to the tyrant's oppressive rule, and hostilities were precipitated between the two States when Uruguay espoused the cause of personal liberty, and proclaimed the free navigation of the Argentine waters. Aided by the Italian volunteers under Garibaldi, and by the British and French fleets in the estuary, the "New Troy" successfully held out against the Buenos Ayres forces under General Oribe.

But the conclusion of peace in 1853 brought little rest to the country, which for a time formed one of the three allies in the war against Paraguay (1865-70), and has continued to be torn by party strife down to the present time. So recently as August 25, 1897, President Borda, a "Red," was assassinated by Arredondo, a "White," in the streets of Monte Video, and since then there have been a *coup d'état*, disturbances in the provinces and a military revolt in the capital, where a state of siege was declared and British marines landed to protect the Consulate in July 1898. Amnesties have since been granted to the civil and military ringleaders, and in 1899 order had been generally restored throughout the republic.

Monte Video itself has suffered much less from these convulsions than might be supposed. Its trade, wealth, and population continue steadily to increase, and it is at present really a fine city, presenting an imposing appearance both from the water and from the crest of the neighbouring *Cerro*, that is the "Green Hill," nearly 500 feet high, from which it takes its name. There is a large cathedral in poor style, but also a beautiful church of the Immaculate Conception, and several of the public buildings—Exchange, Custom House, Post Office, Law Courts, and University—have some good architectural features.

Unfortunately the harbour or roadstead is both shallow and exposed to the full fury of the south-eastern trade-winds. Some improvements have, however, been lately carried out, including piers, wharves, repairing docks, and the removal of the quarantine station to *Flores Island* twelve miles off the coast. But the plans presented by an English engineer for the enlargement of the port by the construction of a breakwater, docks, and

other harbour works at a cost of £3,000,000, are for the present beyond the resources of the State. Water, sufficient for present requirements, is brought in pipes from the Rio Santa Lucia, a headstream of the San Juan, a distance of 36 miles, and tramways are laid down on all the thoroughfares, which run in all directions to the suburbs, and are disposed in the usual chessboard fashion. The government buildings, however, are erected diagonally across the line of streets, thus appearing to obstruct the public ways "in a manner that by local cynics is said to be emblematical of the spirit in which business is sometimes conducted within their walls."[1]

At the entrance of the Plate estuary the little port of *Maldonado* gives access to the town of *Minas*, so called because it is the centre of a mineral district, where the auriferous quartz veins are worked by a few industrious gold-hunters, but yield poor returns. Being sheltered from the east winds by a projecting headland, Maldonado affords safer anchorage than Monte Video, but stands too far apart from the great ocean highways to attract much shipping. Of the vessels belonging to some twenty Atlantic steamship companies, which call regularly at Monte Video, scarcely half-a-dozen find it worth their while to turn aside now and then and visit Maldonado.

North of Maldonado the marshy shores of the Atlantic and the Merim lagoon are scarcely inhabitable; and here the only places of note are *Rocha*, near Cape Santa Maria; *Nico Perez*, terminus of the railway, which is eventually to connect the Capital with Rio Grande do Sul; and *Artigas*, near the mouth of the frontier Rio Jaguarão, which perpetuates the memory of the revolutionary hero, whose exploits have already been referred to.

Of the desolate and dangerous seaboard between

[1] R. Crawford, *op. cit.* p. 18.

Maldonado and the Brazilian frontier a vivid picture is given by Mr. Knight: "The climate, the colour of the clear sky, and the aspect of the vegetation showed us that we had indeed left the tropics. Very different all appeared after torrid Rio, one thousand miles to the northward. It was a low shore, with sandy dunes and hills of no great altitude in the background; a desert-looking country where thistles and aloes seemed especially to thrive. Of ill repute, too, is all this wild coast from here to the Brazilian frontier, and a terror to mariners. The currents of the ocean are powerful and inconstant; there are few landmarks, and disasters to vessels are frequent. On the shore among the surf one can perceive the skeletons of many ill-fated ships, as one coasts along the dreary sand-banks. The only inhabitants are wild Gauchos, professional and skilful wreckers when not employed in ravaging their native country, under the banner of one or other of those rival guerilla chieftains who are ever contesting who shall next be the chief magistrate of revolutionary Uruguay" (*op. cit.* vol. i. p. 99).

Between Monte Video and the Uruguay estuary the only noteworthy place is the old Portuguese settlement of *Colonia*, which stands at the mouth of the little Rio Martin Chico, where De Solis was cut off by the Charruas. In the estuary, where it narrows to about a mile, the port of *Higueritas* has the advantage of a well-sheltered harbour facing the mouth of the Parana Guazu ("Great Parana"), that is, the main branch of the Parana delta.

At the head of the estuary, where the Uruguay is joined by the Rio Negro, is the old station of *Soriano*, which dates from the year 1624, and was here founded to protect the Chana natives from their hereditary foes, the Charrua Indians (see above). The Chanas appear

to have already been evangelised at this time, and the ruins are still shown of the church built for them by the Jesuits. *Fray Bentos*, on the site of another old mission in the same district a short distance north of Soriano, has become one of the most flourishing centres of the meat business in the world. The factory founded here in 1863 for the preparation of "Liebig's Extract" has grown into a small town, employing over 2000 hands, and at times treating the cattle drawn from all the surrounding districts at the rate of about 1000 a day.

Higher up follow the two other great establishments of *Paysandu* and *Salto*, both devoted exclusively to the meat-preserving business. Paysandu, on the bluff nearly opposite the Argentine town of Colon, had also a religious origin, having been founded as a missionary station by the "Padre Sandu" in 1772. But the meek Guarani neophytes have long been replaced by lusty Gaucho drovers and slaughterers, and although destroyed by the Brazilians in 1864, the "city of tongues" is already, next to the capital, the largest place in the republic.

Up to this point the river is accessible to vessels of from 500 to 600 tons burden, and Paysandu also enjoys the advantage of railway communication both with the capital by a junction with the central line at *Paso de los Toros*, and by the Midland line with Salto, which stands at the head of the deep sea navigation about 90 miles higher up. Its speciality is the ox-tongue preserving business, which is largely in the hands of British capitalists. But it is a mistake to suppose that all the "Paysandu tongues" exported to England are tinned in this place. Of over half a million forwarded by the leading English firm scarcely a tenth part are cured at Paysandu, though all are shipped at this riverside port. "Where the cattle are slaughtered, there must the

tongues be preserved. They cannot be carried about in a hot sub-tropical climate before they are tinned, especially as it is in summer that the *saladeros* (curers) work, when the cattle are in prime condition after feeding on the spring herbage."[1]

To British enterprise Salto also owes its prosperity, and the neighbouring *Rio Daiman* and the *Cuchilla del Daiman* are named from the English pioneer, Mr. Dayman, whose extensive ranchos line the banks of the main stream, and stretch inland towards the Cuchillo de Haedo. As a riverside port *Salto* dates only from the year 1817, although long before that time there was a small settlement just below the Falls from which it takes its name. Since the opening of the railway, by which it communicates through Paysandu and *Durazno*, its progress has been continuous, and at present it ranks as the third place in the republic, practically forming a single city with Concordia on the opposite (Argentine) side of the Uruguay.

Railway Enterprise

Since 1869, when the first short coast line was opened, railway enterprise has made considerable progress, especially considering the disturbed state of the country. In 1906 over 1200 miles had been completed and 300 miles were under construction. The central system, having its terminus at Monte Video, runs for 130 miles north to Durazno on the Rio Yi, with a branch 20 miles long connecting the Rio Santa Lucia with San José. From Durazno it extends for nearly 200 miles north-westwards to Paysandu and Salto, crossing the Rio Negro at Paso de los Toros, and ascending the Uruguay for 110 miles beyond Salto in the direction of

[1] *Zephyrus*, p. 168.

Santa Rosa and the Brazilian frontier. A beginning has been made with another line also intended to connect the capital with the north-east frontier of Brazil at Jaguarão; but of this system only the first short section from Monte Video to Pando has been completed.

Resources—The Meat Industries

In Uruguay husbandry in the strict sense of the term is confined almost exclusively to the three southern departments of Canelones, San José, and Colonia, which extend along the Plate estuary from Maldonado to the Uruguay. Here the plough is everywhere steadily, and in some places rapidly, encroaching on the grazing-grounds, and the area under tillage increased from 430,000 acres in 1888 to over 1,250,000 in 1907. The chief crops are wheat and maize, of which the estimated yield exceeded 186,000 and 212,000 tons respectively in 1907. Tobacco, the olive, vine, and fruits are also successfully cultivated, and the pomegranates of the Monte Video district have acquired a widespread celebrity.

But all this is as nothing compared with stock-breeding, and the industries directly associated with the preparation of animal products, such as jerked beef, frozen meat, tinned tongues, beef extracts, hides, skins, tallow, and wool. These must long continue to be the main resources of the country, although their development is still retarded both by the fluctuating demand of the European markets, and by the lack of good communications with the rich pasture-lands of the interior. In 1902 the live stock comprised nearly 18,000,000 sheep, 7,000,000 horned cattle, and 660,000 horses and mules, valued at about £20,000,000, exclusive of the wool clip, which in 1906 exceeded £126,000. In the same year the total

exports of all animal products exceeded £6,500,000, besides live animals £220,000, while all the other exports (wheat, minerals, rubber) were estimated at less than £320,000. In the absence of any other industries all manufactured goods have to be imported, chiefly from Great Britain, which takes the leading place in the international exchanges; while its exports to, greatly exceed its imports from, Uruguay. In 1906 these exports (cotton and woollen fabrics, metal-wares, coal, etc.) exceeded £2,233,000, while the imports (hides, wool, meat extracts, tinned meat, rubber) fell below £538,000.

Of the jerked beef (*charqui*, pronounced *charki*), which is so widely consumed by nearly all classes in South America, immense quantities are prepared in the Uruguayan meat factories. When properly cured, carefully preserved, and skilfully cooked, it may be made palatable; but these conditions are rarely fulfilled, and as a rule strangers do not find jerked meat a savoury article of food. "Charki," writes Mr. Knight, "is merely beef cut into long thin strips and dried in the sun; when fresh it is not bad, but it rarely is fresh; and after these lean shreds have been hanging outside a rancho in the hot, dusty air, they form anything but a luxurious diet. The charki then becomes so much third-rate leather; all the juices have been completely dried out of it, and the grilling of it on an asador over a wood fire does not tend to soften it. The toughness that beef thus treated can acquire is a thing to be experienced not told" (vol. i. p. 222).

In 1895 this staple diet of whole populations was exported from Uruguay to all the surrounding lands to the estimated value of over £1,000,000. As the supply is practically unlimited, while the demand must increase with the growth of population in Argentina and

the south Brazilian provinces, political economists are already looking to the development of this trade as a means of reducing the heavy national liabilities, which were increased by £1,500,000 in 1899, and in 1907 exceeded £25,400,000.

Government—Education—Finance

Soon after the establishment of its political independence, a Constitution was framed for the little republic of Uruguay which dates from the year 1830, and is comprehensive enough for the good government of a great empire. At that time the population of the whole country, debased by years of strife and bloodshed, fell short of 80,000; but the fundamental charter of rights reads as if addressed to many millions of sober and enlightened citizens. The legislative functions are entrusted to a Parliament with an Upper and a Lower House; the executive to a President chosen for four years; the administration of justice to a High Court, with secondary tribunals, and all kinds of provisions against malversation and venality. Guarantees are also devised against hasty legislation and premature reforms, and no revision of the organic articles of the Constitution until it has been considered by three sessions of both Houses.

By the terms of this charter, which has never been either revoked or respected, never understood by a tithe of the people in whose interests it was framed, the annual parliamentary session extends from February to July, and during the adjournment a permanent committee of two senators and five members of the Lower House assume, not only the general control of affairs, but also the legislative power itself. The senators, returned

for six years and one-third retiring every two years, are chosen by an Electoral College, one for each department, the College being elected by popular suffrage. The members of the Lower House are also chosen by the people in the proportion of one for every 3000 male adults who can read and write. A council of six ministers (Interior, Foreign Affairs, Finance, War and Marine, Education and Public Works) assists the President in the exercise of his executive functions.

Although the Roman Catholic is recognised as the State religion, all other creeds enjoy complete toleration both in principle and practice. Protestants are relatively numerous, and in Monte Video alone the different sects were estimated at over 12,000 in 1896, besides 25,000 "not declared."

Primary instruction is obligatory, and in 1906 the attendance at the public, elementary, and private schools exceeded 75,000. Higher education is provided for by normal schools, a school of arts and trades, supported by the State and attended by 200 free pupils, and a university at Monte Video with 530 students in 1905. In the same year there were altogether one school for every 890 inhabitants, one teacher for every 408 inhabitants, and one pupil for every 9 inhabitants.

The land forces comprise a standing army of about 5000, a national guard of some 35,000, and over 3000 armed police. There are also three or four gunboats with a complement of nearly 200 officers and men. All these forces are maintained at a charge of about £540,000 out of a yearly revenue averaging a little over £4,000,000. Another heavy charge on the public funds are the pensions, which are granted for services rendered,

not to the State, but to the successful leaders of the different factions, and in 1898 exceeded £263,000. Thus nearly one-fourth of the State revenues is wasted either on useless armaments or professional politicians, while the interest on the public debt absorbs over a third (£2,100,000 in 1907).

CHAPTER XIII

PARAGUAY

Boundaries, Extent, Population—Physical Features—Hydrography—The Paraguay River and its Affluents—The Upper and Middle Parana Basin—Climate—Flora and Vegetable Resources—Fauna—Stock-breeding—Inhabitants—The Payaguas—The Guarani and the Missions—The Paraguayans—Topography—Historic Retrospect—Administration.

Boundaries, Extent, Population

NAMED from the great river, which for about 200 miles forms its western frontier towards Argentina, Paraguay is sometimes rather inaccurately called the "Mesopotamia of South America." The expression suggests the popular but erroneous idea that this State lies entirely or mainly within the space enclosed west, east, and south by the Parana and the Paraguay converging at Las Tres Bocas. But such is far from being the case, and in point of fact the republic is not merely skirted but intersected by the Paraguay for a distance of 250 miles between the Apa and Pilcomayo confluences. Moreover, for another stretch of nearly 200 miles—from the Laguna de la Bahia Negra to the mouth of the Apa—the Paraguay flows between Brazil on the east and Bolivia on the west side, so that here there is no question of a Mesopotamia at all. The true South

American Mesopotamia lies farther south, where the Argentine provinces of Misiones, Corrientes, and Entre Rios are really enclosed by the two rivers Parana and Uruguay.

That section of Paraguay which lies to the west of the Rio Paraguay, and is called *Paraguay Occidental*, comprises the north-east portion of Gran Chaco, whose frontiers towards Bolivia and Argentina have been described in previous chapters. The rest of the State, that is, *Paraguay Oriental*, does to some extent form a Mesopotamic region, because the southern districts are bordered west, south, and east by the two great arteries as far north on the east side as the Guayra Falls of the Parana in 24° S. lat. Here the conterminous States are Argentina up to the Victoria Falls, where the same river is joined on its left bank by the Rio I-Guazu, and Brazil thence to the Guayra Falls.

Brazil is also the conterminous State along the north-east and north frontiers, where the boundary, as determined by the International Commission of 1871-73, coincides with the crests of the Mbaracayu and Amambay ranges from the Parana to the source of the Rio Estrella, and then follows that river and the Rio Apa, as its lower course is called, to its junction with the Paraguay at Fuerte del Apa in 22° 5′ S. lat. All these frontiers appear to have been generally accepted by the interested States, so that Paraguay, like Uruguay, is no longer troubled with boundary questions.

Although the smallest but one of the South American republics, Paraguay covers none the less a considerable area, estimated at nearly 98,000 square miles, that is, the collective area of England, Scotland, and Wales, with 10,000 square miles to spare. But the population,

reduced from about 1,340,000 [1] to little over 200,000 after the terrible war of 1865-70, was still officially estimated in 1905 at scarcely more than 631,000. These are classed as wild Indians, chiefly in western Paraguay; civilised Indians, chiefly in eastern Paraguay; and whites, mainly Hispano-Guarani half-castes, speaking both Guarani (the *lengua general*) and Spanish, besides recent immigrants from the surrounding States and from Europe, as in the subjoined table:—

Hispano-Guarani (Paraguayans proper)	504,300
Wild Indians, mostly in Gran Chaco	50,000
Civilised Indians, mostly in the Parana districts	60,000
Settlers from Argentina	9,300
,, ,, Italy	2,700
,, ,, Germany	900
,, ,, Brazil	1,400
,, ,, Spain	1,100
,, ,, Great Britain	400
Sundries	1,400
Total (1905)	631,500

Physical Features

The western section of the republic, forming a triangular space of over 40,000 square miles between the rivers Paraguay and Pilcomayo, with its apex at the confluence and base coinciding with the conventional boundary line towards Bolivia, constitutes the north-eastern corner of Gran Chaco, and everywhere presents the same geological conformation and general aspect as the rest of that region. It is an almost level low-lying tract, which was formerly flooded by the Pampean Sea,

[1] This somewhat vague estimate is, however, reduced to about 800,000 by Dr. E. de Bourgade La Dardye, who calculates that as many as three-fourths of the nation perished in the war, leaving an approximate population of 250,000 for the year 1872 (*Paraguay*, Ravenstein's English ed., p. 105).

and is still exposed to vast periodical inundations, thus presenting the appearance of a land in process of formation. Standing at a mean altitude of less than 500 feet, with a scarcely perceptible southerly tilt, the soil is but partly relieved of its superabundant moisture mainly by evaporation, and the water lodging in the shallow depressions is so charged with salt as to be scarcely potable. During the floods these depressions, as well as the sluggish streams themselves, become merged in a continuous watery expanse, which thus intermittently revives the aspect of the old marine basin, and after its subsidence leaves the surface saturated and malarious.

Beyond the Paraguay, which is a physical as well as a political divide, the land rises to a hilly plateau standing at a moderate elevation of about 600 feet, and intersected diagonally from north-east to south-west by the broken sections of a very old mountain range. Under the various designations of *Urucuty*, *Caa-Guazu* and *Villa Rica*, this range forms a southern continuation of the Brazilian *Serra d'Amambay*, and like it everywhere serves as the water-parting between the Parana and Paraguay basins. It enters Paraguay territory at the point where the Amambay chain bends sharply round from south to east, and continues under the name of the *Serra de Mbaracayu* in this direction along the 24th parallel to the right bank of the Parana, and deflects that river from west to south at the Guayra Falls. At its southern extremity the Villa Rica section again strikes the Parana at a point below Villa Encarnacion, where are developed the Iacyreta and Apipé falls and rapids.

Although dignified with the title of "Cordilleras," the Paraguayan sections of the system nowhere attain an altitude of over 2000 feet, and their true character of rounded and densely-wooded hills is betrayed by the

local expression *Sierra de los Montes*, that is, "Forest Range." In fact the Urucuty and Caa-Guazu sections traverse the densely-wooded north-eastern and central districts, where the difficulties of the communications between the *yerbales* (*maté* tea plantations) on both sides of the chain are caused, not by the height or rugged character of the hills, but by the tangled masses of tropical vegetation by which they are overgrown. Even the frontier ranges themselves—Amambay and Mbaracayu—have a mean height of probably less than 3000 feet, and are easily crossed by hunters, explorers, and maté gatherers about the Brazilo-Paraguay borderlands. Yet, like the other Brazilian mountain systems, of which they are south-western offshoots, all these now degraded ridges have undergone a tremendous amount of weathering and denudation. "Long before the mighty upheaval of the great Cordillera these very hills sustained the continent of [South] America, and protected its eastern plateaux from the incursions of the sea. The action of the climate has wrought their destruction; torrents, unceasing and inexhaustible, debased their topmost crests, filled up their crevices, and little by little the unremitted work of erosion denuded the mountain-flanks of the granite by which they were upheld. Portion after portion has crumbled away, and the fragments have had an enormous share in filling up the vast estuaries which indented the American coast-line at the Tertiary era. It was probably the Pliocene period [late Tertiary] that witnessed in their greatest intensity the phenomena that gave the continent its present configuration. All the eastern part of the land remained upheaved, while the western zone sank down to a considerable depth, allowing the Pliocene [Pampean] sea to penetrate to the very heart of America."[1]

[1] La Dardye, p. 9.

No doubt the volcanic phenomena, which accompanied the folding and upheaval of the Andean system, extended eastwards to the Paraguayan uplands. Thus may be explained the presence of several igneous cones, such as the *Cerro Tucumbu* close to Asuncion, and the *Acay* heights (2000 feet) near the head of the Rio Mbuarapey, a tributary of the Tibicuary. Here are numerous mineral springs, and earthquakes are of frequent occurrence in the district. Elsewhere extensive tracts are covered to depths of several feet and even yards with a red earth which, like that of the Brazilian province of S. Paulo, is extremely fertile and well suited for tobacco culture.

Recent scientific research has determined in Paraguay two distinct geological regions—the north, which as far as about 22° S. lat. is covered with limestones, and the south, where sandstone formations prevail. Such a constitution is not favourable to the presence of the precious metals; but the whole country may be described as one vast mass of ironstone and manganese, iron abounding especially in the southern, and marble in the northern area. Pyrites occur in considerable quantities; kaolin has been discovered in many districts; copper lodes are also spoken of, and coal, hitherto supposed to be absent, is now believed to be embedded in the southern sandstone rocks, but apparently at some depth below the surface.

Hydrography—The Paraguay River and its Affluents

While Western Paraguay belongs entirely to the Rio Paraguay basin, the eastern section drains partly to that river and partly to the Parana. But the already described divide between the two main streams lies far to the south-east, so that only a relatively small section of the whole territory, probably not more than 20,000

square miles, is comprised within the Parana basin. Moreover, the Parana itself is everywhere only a frontier river, whereas for 250 miles of its course the Paraguay traverses the central and by far the most thickly peopled districts of the republic. When it is further considered that at the confluence in the south-west corner of the State it is lost in the Parana, while only comparatively insignificant parts of Brazil and Bolivia are comprised in its narrow and less important upper basin, one feels less surprise at the pretentions of former Paraguayan rulers, who claimed the right to exercise exclusive control over this great waterway.

In some respects the Paraguay bears the same relation to the Parana that the Mississippi does to the Missouri, but with this difference, that in the northern system the smaller of the two branches retains its name from its source to the delta, whereas in the south the smaller is absorbed in the larger at the confluence. Why this should be so is not quite evident, seeing that the Paraguay, like the Mississippi, follows the meridional line from north to south, which in both cases seems to be the natural direction of the main fluvial axis. Some eminent geographers have, in fact, always held that the united stream below the confluence should have kept the name of the Paraguay, the more so since the natural lower course of the Parana would seem to be the Uruguay, from which it is deflected abruptly westwards only by a projecting offshoot of the Sierra de los Misiones above Villa Encarnacion. But all such considerations were outweighed by the much larger size of the Parana, that is, the "River" in a pre-eminent sense. Hence the great north-eastern branch, whose volume is often ten times larger than that of the Paraguay at the confluence, retains its name for the rest of its course to the Plate estuary.

The Paraguay rises about 1000 feet above sea-level on the Matto Grosso plateau, which forms the water-parting between the Amazon and Parana basins. At *As sete lagoas,* perhaps its farthest source (in 14° 35′ S. lat. and 56° 10′ W.), the divide is so contracted that the head-waters of the Tapajos affluent of the Amazons seem to intermingle, or at least to overlap those of the Paraguay in the Diamantina district above Cuyaba. The *Arinos,* a branch of the Tapajos, is even said to flow from the same lagoons as the Paraguay, while a head-stream of the *Jauru* affluent has actually been connected by a canal half-a-mile long with the *Alegre,* which joins the Guaporé, or upper course of the Madeira a little south of Matto Grosso.

Soon after escaping from the hilly district of the sources, where it tumbles over a series of rapids with a total fall of nearly 400 feet, the Paraguay begins at once to flow in an almost level bed, with a tranquil uniform current, and an incline of not more than 3 or 4 inches per mile. In fact, from its junction with the S. Lourenço on its right bank to the Plate estuary, a distance of over 2500 miles, the absolute incline is only about 600 feet, and is so uniformly distributed that the channel is nowhere obstructed by a single rapid, although the navigation is not considered quite safe until the somewhat dangerous reach at *Los Arrecifes* near the now ruined settlement of San Salvador has been passed. Hence the Paraguay is completely navigable from the Atlantic into the very heart of Brazil, and small steamers even ascend the S. Lourenço to the mouth of the *Rio Cuyaba,* which leads to the town of the same name in the province of Matto Grosso. Such a fluvial regime is explained by the fact that throughout the greater part of its course the Paraguay traverses the level bed of the

old Pampean Sea, traces of which may still be detected in the so-called "*Laguna*" *de los Xarayes*, a vast level plain which under several names (*Laguna Mandiary, Laguna de Caceres, Gaiba*, etc.) extends for 360 miles all the way from above the S. Lourenço to and beyond the confluence of the *Tacuari* and *Miranda*, which join the left bank near Coimbra.

When the Spanish pioneers first penetrated to this region, they described it as a boundless lake—being probably flooded at the time as it still is periodically —and regarded it as the source of the Paraguay, investing it with marvellous properties, and reporting that in the midst of these waters dwelt El Dorado, the ever-receding goal of all their early expeditions to the interior. The plain, which is skirted on its west side by the upper course of the Paraguay, has still its flooded inlets and *bahias* ("bays"), and these deeper parts are not only permanently submerged, but even here and there have a brackish taste, derived from the thick saline incrustations deposited by the old inland sea.

The true character of the Xarayes region has been somewhat misunderstood, owing to the term "laguna," popularly applied to its different sections. It is neither a lagoon or shallow lake, nor yet a morass or marshy depression, but a true plain of vast extent, standing at almost a dead level, and in the dry season watered by numerous perennial streams, which during the floods, from about March to July, are merged in a single sheet of water stretching away in all directions beyond the horizon, and diversified by numerous low verdant islands, or solitary clumps of trees rising above the surface. After the subsidence, the watermarks of the recurrent inundations are plainly visible on the stems of these trees, which represent, not the scrubby vegetation of fens

or moorlands, but the vigorous arborescent growths of a firm tropical soil.

Below the Xarayes flats the Paraguay is joined on its right bank by the navigable Rios *Tucabaca* (*Olinden*) and *Otuquis*, and a little farther on by the *Bahia Negra*, where begins that section of Gran Chaco which is comprised in Paraguay territory. Beyond this point the only important affluents on the right bank are the already described Pilcomayo and Bermejo. But about 190 miles below the Bahia Negra it receives on the left side the *Rio Apa*, forming the frontier towards Brazil, and from this point to the Parana confluence its course lies entirely within Paraguayan territory. Here its waters are swollen by several tributaries from the east, none of which possess much economic importance except the *Aquidaban*, the *Jujuy*, and the *Tibucuary*. The Aquidaban, which rises in the Amambay range above Punta Pona, flows mainly west to its junction with the main stream some 15 miles north of Concepcion. Although it sends down a large volume its rocky bed is so obstructed with rapids that the *yerbateros*, that is, the people engaged in collecting yerba-maté in the interior, have abandoned all efforts to utilise it for traffic. This turbulent stream flows through some magnificent woodlands, where trees 60 to 90 feet high and 20 feet in girth are quite common.

But of all the Paraguayan rivers the most important is the Jujuy, which rises in the *Cerro Noguez*, converging point of the three mountain ranges, and with its widely-ramifying branches drains nearly one-fourth of the whole territory. Many of its numerous affluents are navigable, and the main stream may be ascended for a considerable distance by boats of 40 tons. A few miles beyond the town of San Pedro the Jujuy falls into the Paraguay through two arms just above *Barranquerita*, a military

station where all steamers stop at present. The Jujuy, which was first thoroughly explored by La Dardye in 1887, possesses great commercial value, and in its basin are situated some of the finest yerbales in the country.

Below Asuncion the marshy region, which extends all the way to the Parana confluence, is traversed and partly drained by the Tibicuary, a sluggish meandering river which, after receiving the overflow of the large *Laguna Ypoa* through the *Rio Negro* emissary, flows in a channel 300 yards broad to the Paraguay some miles below Villa Franca. The Tibicuary, which also waters some rich maté forests, is formed by the junction of two considerable head-streams, the *Tibicuary-mini* and the *Tibicuary-guazu*, which flow from the slopes of the Caa-Guazu and Villa Rica ranges, and unite in a single channel below the *Cerro Santa Maria*.

Below the Tibicuary the main stream continues to flow with many windings in the normal direction of south by west, and after passing the bluff formerly crowned by the famous stronghold of Humaita, enters the Parana through three arms (the *Tres Bocas*) just above Corrientes. Here the Parana, coming from the east, may be said to usurp the bed of the Paraguay, and M. de Saint-Adolphe amongst others expresses his surprise that geographers should give the name of the Parana to its lower course, which continues to flow in the same southerly direction till it bends round to join the Uruguay at the head of the Plate estuary.

But taking the section from the Tres Bocas to the Uruguay as the lower course of the Parana, such is the generally uniform character of the Paraguay branch that its three main sections have to be determined rather on political than on physical grounds. Thus, from its source

to the S. Lourenço confluence it lies entirely in Brazilian territory, and this section, where the incline is somewhat rapid above the Xarayes flats, may be taken as its true upper course. Then the middle course, where it forms the boundary between Brazil and Bolivia, will extend to the Bahia Negra, and the lower course from this point to the Parana, the main stream here flowing first between Paraguay and Argentina, and then altogether in Paraguayan territory. The total distance from its source to Corrientes is about 1000 miles, of which nearly 900 miles are navigable for small craft throughout the year, and for large vessels at high water, when the Paraguay rises at times from 20 to 30 feet above its normal level.

The Upper and Middle Parana Basin

No difficulty is presented by the Parana branch, whose natural and political divisions are in complete harmony. Its upper course, formed by the junction of the Rios *Grande* and *Paranahiba,* terminates naturally at the Guayra Falls, and consequently belongs entirely to Brazil. From these Falls to the Paraguay confluence it flows as a frontier river first between Brazil and Paraguay and then between Paraguay and Argentina, and this clearly marked section is rightly regarded as its middle course from the strictly physical standpoint. Lastly, the elsewhere described lower course is an Argentine waterway throughout its whole length from the Paraguay confluence to the Plate estuary. What is remarkable about these three sections is that the first and third, flowing in deep and slightly inclined channels, are for the most part tranquil navigable streams, whereas the second, rushing in a rocky bed down a steep incline and over numerous reefs, rapids, and even falls, is practically

useless for navigation, despite the enormous body of water it rolls down to the Pampean plains.

This curious phenomenon of the great artery assuming somewhat the aspect of a mountain torrent, not in its upper valley but in its middle reaches, has been a main factor in determining the course of events in the southern continent since its occupation by the white man. The circumstance was taken advantage of by the Jesuits, who founded their chief missions in the region of the cataracts, where they hoped to enjoy that seclusion from the outer world which was needed for the peaceful development of their theocratic system of government. To the same cause is largely due the fact that Paraguay is now an independent Hispano-American State, instead of an obscure province of the Brazilian republic. The Paulistas and other early Portuguese pioneers, arrested by the almost impassable barrier of the *Sete Quedas* (the "Seven Falls" of Guayra), turned their energies in other directions, and thus gave the first Spanish colonists time to secure a strong footing in the Paraguay basin above Corrientes. Hence it is that, when the Guarani congregations melted away, after the expulsion of the Jesuits, the Middle Parana region reverted to its primeval state of a silent wilderness, where the solitary traveller occasionally stumbles upon the picturesque ruins of some Christian church festooned with lianas, while all life and movement are now centred in the old Spanish settlements along the banks of the Lower Paraguay.

Some 40 miles below the junction of its two headstreams, in 19° S. lat., the Upper Parana is precipitated a height of 15 to 20 feet over the *Urubupunga Falls*, which appear to be the only obstruction to its navigation above the Guayra Falls. Between these two points its current is swollen by a great number of tributaries, the

largest of which are the *Tieté* and the *Paranapanema*, which join the left bank from the province of S. Paulo. Despite its great length and volume, the Paranapanema, that is, the "Useless River," is so obstructed by rocky ledges and rapids that it is quite useless for navigation. At the *Salto Grande* ("Great Falls") a body of about 1000 cubic feet per second tumbles from a height of over 30 feet into a narrow rocky gorge, beyond which occur several other cascades.

Just above the Guayra Falls the Parana expands into a large basin 4 or 5 miles wide, whence it issues in two branches which, like Niagara, enclose a large island, and then develop a number of separate swirling channels, which, after piercing the projecting spurs of the Sierra Mbaracayu, plunge from heights of 50 to 60 feet into a seething chasm of immense depth, but not more than 200 feet wide. From the rushing channels the cataract takes its Portuguese name of the "Seven Falls"; but the number is not to be taken too literally, as they vary with the seasons, while during the floods all are merged in a single stream. Then is presented the sublime spectacle of one of the mightiest rivers in the world precipitated bodily into a fathomless abyss, and La Dardye, to whom we owe the only accurate account of the Falls, may well ask whether they are equalled in size and grandeur even by Niagara itself.

At the Guayra Falls, which are so named from the old Jesuit station of *La Guayra*, the Parana strikes the Paraguayan frontier, and turning abruptly south enters on its middle course, where it is at first confined to a relatively narrow rocky bed. Throughout the whole of this section, about 400 miles in length, the main stream is joined on its right bank only by some comparatively small tributaries from Paraguay. Of these the largest

appears to be the *Rio Pelotas* or *Igurey*, which rises at the Cerro Noguez close to the sources of the Jujuy, and after a course of about 70 miles, of which 20 are navigable, enters the Parana some 30 miles below the Guayra Falls. On the left side the chief affluent is the *I-Guazu*, *i.e.* the "Great River," which drains a considerable portion of the Brazilian provinces of Parana and Sante Catharina,

VICTORIA FALLS OF THE I-GUAZU.

and joins the Parana at the point where it leaves Brazil, and for the rest of its course to the Paraguay confluence forms the boundary between Paraguay and Argentina. It was along the valley of the I-Guazu, which rises as the *Rio Grande do Curitiba* on the slopes of the Coast Range, that the famous adventurer Alvar Nuñez (Cabeza de Vaca) made his way in 1542 across the continent from the Atlantic to Asuncion on the Paraguay. About six miles above its junction with the Parana, the I-Guazu

develops the *Victoria Falls*, which although inferior in volume are much higher, about 200 feet, than those of La Guayra.

About 100 miles below the I-Guazu confluence, the Parana, still flowing south as if to join the Uruguay, is turned westwards to the Paraguay by the Sierra de los Misiones. Here the incline is still considerable, and the current rushes on with such velocity that in the course of ages it has cut its hard sandstone bed down to depths of 120 or 150 feet below the level of its rocky walls, thus excavating long gloomy gorges that have even been compared with the cañons of the North American Colorado. Beyond the point where it seems to desert the valley of the Uruguay, the main stream does not reach the normal level of the Rio Paraguay until it has surmounted a long series of rapids below Encarnacion, where it has to force its way through the southern spurs of the Villa Rica range, and where its channel is divided by the large islands of *Iacyreta* and *Apipé*, surviving fragments of those very ancient mountains. Here at last the mighty Parana enlarges its borders, and flows—a calm majestic waterway, several thousand feet wide—through the vast marshy tract, where it usurps the bed of the Paraguay above Corrientes.

This low-lying and almost perfectly level swampy region, which certainly formed part of the old Pampean sea, extends for a distance of over 120 miles on both sides of the Parana. Remnants of the marine basin are the *Ypoa* and *Camba* lagoons on the north (Paraguayan) side, to which the remarkable *Iberá* lagoon corresponds on the opposite (Argentine) side. So slight is the incline in this extensive flooded depression of the "Clear-water," as the word has been interpreted, that the engineers have been able to give the Ibera a double out-

flow, north to the Middle Parana below the Apipé rapids, and through the Rios Batel and Corrients south to the Lower Parana above La Paz. Thus the vast Parana-Paraguayan hydrographic system is found to be, so to say, still in touch with the ancient inland sea at such distant points as the Ibera and the Xarayes lacustrine districts. The lower section, where the two head branches flow in a single channel from the Tres Bocas to the Plate estuary, is described in Chapter IX.

Climate

Lying between 22° and 28° S. lat., Paraguay is essentially a sub-tropical region, where the normal climatic conditions, as determined by latitude, are disturbed neither by marine influences nor by lofty mountain ranges or other local features. The land, however, is sheltered somewhat by the Brazilian uplands from the warm equatorial currents, while it is fully exposed to the refreshing south-western pamperos, hence enjoys on the whole a cooler and healthier climate than many regions lying between the same parallels. The four seasons are not sharply distinguished, and Dr. La Dardye divides the year into nine months of perpetual spring, and three summer months—December, January, and February—which, although undeniably hot, are less sultry and oppressive than in Venezuela and the Guianas. This agrees very well with the records of the mean annual temperature of Asuncion, about 250 feet above sea-level, which is a little over 72° F., rising to 80° in January and falling to 63° in June, although such extremes as 40° and 100° and even 104° have occasionally been observed.

The country suffers more from droughts than from excessive moisture, because the precipitation is mostly

confined to the three months of August, September, and October, when the total rainfall amounts to 46 inches, leaving very little for the rest of the year. Except small-pox, which has been much diminished since the introduction of vaccination, there are no epidemics, and endemic complaints are hardly known beyond the now almost uninhabited eastern districts, where the *chucho*, a somewhat virulent intermittent fever, is prevalent. On the whole Dr. La Dardye, who has given the subject special attention, pronounces the climate "both temperate and healthy" even for "European immigrants observing hygienic rules" (*op. cit.* p. 73).

Flora and Vegetable Resources

Despite its relatively limited extent, Paraguay may claim to possess two distinct botanical zones, corresponding to the two sections of the country divided by its great waterway. Eastern Paraguay is still mainly covered with primeval subtropical and even tropical woodlands, with magnificent trees of great economic value, often matted together with flowering creepers. These woodlands, however, are not continuous, but interrupted in many places by extensive open tracts under tall, tufted grasses, and by low hilly ridges overgrown with *pindo* and *mbocaya* palms. But the most characteristic as well as the most valuable plant is *yerba-maté* ("Paraguay tea"), which is here indigenous, although it ranges also beyond the Parana into the neighbouring provinces of Brazil. In the cultivated districts oranges, tobacco, sugar-cane, manioc, tomatoes, beans, and several cereals yield good returns.

A great contrast to all this exuberance of vegetable growths is presented by that section of Gran Chaco

which constitutes Western Paraguay, and has mostly the aspect of swampy moorlands, diversified with dense *quebracho* forests (*Loxopterygium Lorenzii*) and palms, such as the *Cocos yatais*, growing openly rather than in

PARAGUAY TEA.

compact masses. Amongst the species which range also into Eastern Paraguay is the valuable *quebracho colorado*, which is so heavy that it will not float, and for strength and durability is scarcely equalled by any European tree.

Other useful trees and shrubs, of which as many as

3000 species were collected by M. Balanza in a limited area, are the dragon's blood (*Croton succirubus*); several varieties of the bombax, which yields a vegetable silk; the *palo de rosa* (rosewood); the *incienso, i.e.*, the incense tree of the Jesuits; the guava (*Psidium microcarpum*); the *mamon* (Papaw-tree), and a large number of orchids, dye-woods, and medicinal plants, many of which are unknown, or known only by name, in Europe.

But of all the vegetable products of the country incomparably the most important for its future development is the plant of the *Ilex* family (*Ilex paraguayensis*), which the Guarani people call *caa* (whence the name of the *Caa-Guazu*, central range), and the Spaniards *yerba-maté*,[1] and which yields the infusion generally known as "Jesuit" or "Paraguay tea." Although the plant is met also in parts of Argentina and of Brazil (*herva-do-maté*), it attains its greatest perfection in Paraguay, where it covers large tracts, the so-called *yerbales*, on both slopes of the central range. In the time of the Jesuits the plantations were carefully cultivated by processes which secured a never-failing supply of periodical crops. But since their expulsion the secret of their method has been lost, and at present there is no properly organised system of cultivation, the yerbales being worked in much the same manner as are the rubber-yielding plants, which grow wild in the Amazonian woodlands. Nevertheless the yield is steadily increasing to meet the

[1] From *yerba*, herb, and the Quichuan word *ma-té*, calabash, the full expression being *yerba del maté*, that is, the "calabash herb," being so called because the infusion is made with hot water in a calabash teapot, from which when cool it is sucked up through a tube. It should be noted that, despite its Spanish name, the plant is not a "herb," but a shrub or even a tree, as indicated by its native name, *caa*, which means "tree," in a pre-eminent sense. There are at least three varieties, one of which, in the Ygatima valley within the Brazilian frontier, attains a height of 25 or 26 feet, with a girth of 3 or 4 feet.

constantly increasing demand for Paraguay tea, which has become the favourite beverage not only in Paraguay itself, but also throughout Argentina and in many parts of Brazil. Thus the quantity of the leaf exported rose from about 5000 tons in 1896 to over 6000 in 1903, the popularity of the drink being explained by its now admitted immense superiority over tea, coffee, and coca as a tonic, and as a stimulant to the physical and mental powers, without causing any reaction or waste to the system. This conclusion is based, not so much on the scientific analysis of the properties of maté as on the experience of the multitudes who now prefer it to all other analogous drinks, even in those districts where excellent coffee and coca are procurable. Its consumption is still confined to South America. But when the Old World discovers that "yerba-maté is the cheapest, most wholesome, and tone-giving of beverages, then the ports of Europe will be thrown open to the trade, and its populations swell the demand for an article of diet that ranks among the very best."[1]

Next to the yerbales in present importance and future promise are the *naranjales*, the "orange groves," some cultivated, some running wild all over the land, but all displaying marvellous vitality, and yielding, not periodical crops, but a continuous supply nearly all the year round, neither fruit nor blossom ever completely failing in a region of almost perpetual spring. So widespread is the shrub that La Dardye, while admitting the introduction of the sweet orange and the lemon by the Jesuits, has difficulty in believing that some varieties besides the *apépu*, an undoubtedly native species, are not indigenous. "Everywhere, on the banks of the rios, in the gorges of the far-off sierras, near the ranchos, round the estancias,

[1] La Dardye, p. 221.

in the solitude of the forests, the trees are seen with their golden fruit and deep-green foliage, in rows, in terraces, in groves—everywhere, on mountains and on plains, they grow and break the blue horizon with their rounded outline, and it seems as if they must have flourished there from all antiquity" (p. 222). All are of prime quality, more fragrant and luscious than those of Valencia and Italy, while in hot weather the apépu is preferred because of its slightly acid flavour. During the five years' war most of the groves in the settled districts were fired or out-rooted. But such is the fecundity of the plant, springing up again wherever a pip is dropped from a parrot's beak or a leaf wafted on the breeze to some favourable site, that the ravages of warfare have to a large extent been already repaired. The amber and yellow fruits again lend their charm to the landscape, and twenty of the finest quality are cried for a penny in the streets of Villeta. After myriads had been consumed by the natives, or left to rot ungathered, enough still remained for exportation to the number of 105 millions in the year 1898. Clearly orange-culture, also an heirloom of the Jesuits, has a great future for Paraguay, especially when taken in connection with the recent development of allied industries, such as the preparation of an excellent orange wine, quite free from the flavour of the fruit, and the extraction of citric acid, citrates of lime, orange-water, candied peel, and other products of the orange and citron plants in constant demand.

That the Paraguayans, pre-eminently a nation of smokers, should also have their tobacco plantations is but natural, seeing that both soil and climate are well suited for the cultivation of this herb. Although little known in Europe, owing to the difficulty of securing a regular

supply, the Paraguayan leaf is equal to the finest Havana, and the specimens shown at the Paris Exhibition of 1889 were awarded a gold medal. It is grown exclusively in the red earth districts, the soil of which is of the same character as the red earth of Cuba, which produces the choice *vuelta abajo* variety. But at present the yield scarcely suffices to meet the demand of the local and Argentine markets, and in 1903 the amount exported fell short of 65,000 cwts., valued at nearly £360,000. With improved processes and more regular communications, this industry would be capable of indefinite development. The extent to which the natives of both sexes and almost all ages indulge in the habit of smoking may be judged from the calculation which has been made, that the daily consumption of cigars averages about seven per head of the whole population.

Fauna

Of the large carnivora the puma is very rare, although common in Argentina, whereas both the jaguar and the tiger-cat (*Felis Geoffroi*) are met in all the wooded districts. During the great war the jaguars acquired a taste for human flesh from the bodies of the dead and even of the wounded left to die in the forests. But these "man-eaters" are now extinct, and at present the "American tiger" seldom attacks man except in self-defence. A more characteristic but less known animal is the *aguara-guazu* (*Canis jubatus*), a species of wild dog, or perhaps wolf, nearly three feet long, and so fierce and powerful that, according to the natives, it will not hesitate to attack the jaguar itself. It is of a tawny colour, with long hair, very large erect ears, long bushy tail like that of a fox, long black legs and a black stripe

down the back. It frequents the swampy districts, and hunts in small packs at night, making a peculiar hoarse bark, which is heard at a considerable distance, and produces a depressing effect on benighted wayfarers. The marten family is represented by several species, such as the Parana otter (*Lutra paranensis*) and the southern pole-cat (*Mephitis patagonium*), locally called the *zorino*.

Other members of the general South American fauna are the ant-bear, very large and even dangerous; the tapir, with a thick hide almost bullet-proof except in the forehead and behind the shoulder; the peccary, numerous herds of which are sometimes met rushing along and sweeping everything before them; several varieties of the armadillo, all edible, and one, the *mulita* (*Praopus hybridus*), regarded by the Argentines as a choice delicacy; lastly the web-footed capybari, of amphibious habits. There are also several kinds of deer, all called *guazu* ("great") by the natives, but distinguished as *guazu pyta*, *guazu vira*, *guazu pucu*, etc.

Of birds there is an endless variety, from the huge waders, such as the *tuyuyu* (*Ciconia maguari*), down to the tiniest humming-birds. Contrary to the general impression, many are distinguished as much by their melodious notes as by their gorgeous plumage. But the popular idea that lovely plumage is never, or rarely, associated with lovely music, has been sufficiently dispelled by the observations of Mr. W. H. Hudson, at least for the South American avifauna.

All the rivers team with saurians of many species, the characteristic crocodile of the Parana being the *yacaré* (*Alligator sclerops*), which is sometimes 10 feet long, and very powerful, but less voracious and aggressive than those of the Amazon and Orinoco. The same remark applies to nearly all the members of the numerous snake

family, which slink away at the slightest noise and never bite unless touched or trodden upon. Yet some of the Paraguayan species, such as the rattle-snake, the viper, and cobra, jaraca (*Leucurus*), and *ñacanina*, are amongst the most venomous in the world. Exceptionally the little *ñandurié*, which looks at a distance like a greenish-grey earth-worm, difficult to distinguish from the surrounding foliage, is also aggressive. When startled, instead of retreating, it springs up erect on its tail, vibrates its head, and immediately attacks, its bite being fatal in a few hours.

On the other hand, the huge boas, strong enough to break a man's backbone, are singularly inoffensive, and will even abandon their prey if pricked with any sharp weapon. Far more dangerous and dreaded are the enormous water-snakes of the *Murina* tribe, locally called *mboy-yagua* ("serpent-dogs"). Some of these monsters are nearly 30 feet long, and so powerful that they upset canoes, and drag bathers under the water. The rivers infested by them swarm with many species of fishes, such as the *dorado*, the *paca*, *surubi*, and *sabalo*, which possess economic value, being not only edible but even prized for their delicate flavour. Others of coarser quality—the *palometa*, *armado*, and *bagre*—are attracted in shoals to the saladeros, where they gorge on the offal thrown into the river. As in so many other parts of the southern continent, extensive tracts, especially the marshy woodlands, are rendered almost uninhabitable by the clouds of flies, gnats, mosquitoes, and other winged as well as wingless pests of all kinds. But, as the tsetse-fly disappears in Africa before the planter, here also the settled districts, when brought under cultivation, enjoy almost complete immunity from these noxious creatures.

Stock-Breeding

Most of the European domestic animals were introduced by the early settlers. But all did not find congenial homes in the Paraguay basin. Neither pigs, goats, nor poultry appear to thrive, and the country is too hot, or else the herbage too coarse for profitable sheep-farming. Hence stock-breeding has hitherto been mainly confined to horned cattle and horses. Even this industry has had to start afresh after the "five years' agony," during which the greater part of the domestic animals were killed off. But since then there has been a considerable and even rapid increase, especially of the oxen, which after falling from about 2,000,000 before the war to less than 15,000 in 1870, again increased to 2,743,000 in 1906. In the same year the horses, mules, and asses numbered 183,000, and the sheep 214,000, while hides, mostly dressed in the local tanneries, were exported to the number of 272,000, valued at £530,000. It is noteworthy that the descendants of the old Spanish cattle improve in the direction of the north, so that those of Paraguay are better than the Corrientes herds, while the Miranda breed of Matto Grosso is reputed to be the finest in South America.

But this law has in recent years been disturbed by the crossings in the south with fresh stock from England, so that at present many of the Argentine and Uruguayan beasts are more valuable for meat-preserving purposes than those of Paraguay, where these industries have so far been but little developed. This is due not only to the relatively small extent of the grazing-grounds, but also to the lack of regular communications with Europe. No doubt the great waterway is accessible to vessels of heavy burden all the way to Asuncion. But its naviga-

tion, chiefly for want of capital, has hitherto been neglected, and in 1905 this river-side port was visited only by 460 ships of less than 110,000 tons.

For the same reason railway enterprise has been retarded, and in 1908 only one line 156 miles long had been opened. It runs from Asuncion through Villa Rica south-eastwards to Pirapo, and still remains unconnected with the Argentine and Uruguayan systems.

Inhabitants—The Payaguas

No serious attempt has yet been made to settle the western section of the republic, which is still inhabited almost exclusively by a few wild tribes, such as the *Chamacocos, Angaïtes Sanapanas*, mostly akin to, and scarcely less ferocious than, the Tobas of the Pilcomayo. Except the Sanapanas, who have in recent years been attracted to the neighbouring settlements, even seeking employment on the plantations, all these Gran Chaco tribes have retained their warlike instincts, and not only maintain a hostile attitude towards the whites, but live in a state of perpetual strife among themselves. Between them and the Guarani populations of Eastern Paraguay formerly dwelt the numerous and powerful *Payagua* nation, who were long dominant along both banks of the Paraguay river, which, according to some authorities, was named from them. But they became involved in the operations of the great war, in which most of them perished, and since then the few survivors appear to have been absorbed in the general population. Their practical extinction as a distinct people was perhaps hastened by their peculiar speech, a stock language of such harsh utterance that none of the surrounding tribes could ever understand or learn to speak it.

The Payaguas were famous boatmen and river pirates, building wonderfully light canoes, with which they made rapid plundering excursions up all the tributaries of the main stream, and spread the terror of their name throughout all the lands comprised in the Upper Paraguay basin. They had many usages in common with the Guaicurus of those regions, and some authorities regard them as a branch of that nation, from which they separated about the year 1770.

The Guarani and the Missions

In any case the Payaguas were quite distinct in appearance, speech, and temperament from the *Guarani*, who formed the bulk of the primitive inhabitants of Eastern Paraguay, and of all the conterminous lands in the Middle and Upper Parana valleys. The original seat of the widespread Guarani race has been traced to the forest region about the Parana, the Paraguay, and the Uruguay rivers, where the national characteristics and language were preserved in the greatest purity. Although the term "Guarani" is said to mean "warrior," they were not as a rule a savage or ferocious people, but rather of a gentle disposition, as was afterwards shown by the docility with which they submitted to the severe discipline imposed upon them by their Jesuit teachers and masters. But that a warlike spirit slumbered beneath this outward show of meekness was made evident by their heroic conduct during the great war, as well as in pre-Christian times, when they appear as a conquering people, who increased their strength and numbers not so much by bloodshed as by reducing and incorporating in the nation all the surrounding tribes.

Towards the south their expansion was barred by the

indomitable character of the still more warlike Charruas and Pampas Indians of Uruguay and the Argentine plains of the Lower Parana. In the direction of the north and north-east, also, the physical conditions of a region either under primeval forests, or consisting of almost impassable arid campos of vast extent, were opposed to the establishment of a great political empire, like that of the Incas on the more open Andean plateaux. But the Guarani race none the less filtered through in sufficient numbers to impose their mellifluous and easily acquired language on a multitude of peoples, ranging from the Tupis of the Atlantic seaboard, through the Mundrucus and others of the Middle Amazon basin, to the Cocomas and Omaguas under the very roots of the Cordilleras.

Thus it happened that when the Jesuits founded their missions in the almost inaccessible region amid the cataracts of the Middle Parana, they found it convenient to adopt a modified form of this widely-diffused Guarani-Tupi speech as the *lingoa geral*,—the common medium of instruction and intercourse amongst their rapidly increasing native congregations. So rapid, indeed, was the increase that within five years of the time when they first penetrated in 1620 to the secluded district below the Guayra Falls, they had already established several stations, in which over 50,000 Indians were settled in regularly organised communities. The "reductions," as the stations were called, implying that here the natives were "reduced" from the savage state and brought under the civilising influences of the Church, continued to multiply, until in Paraguay alone they comprised altogether about 140,000 members in 1768, when everything was brought to an end by the expulsion of the Jesuits.

This astounding success, achieved under almost over-

whelming difficulties, was due partly to the admirable tact and skill with which the padres appealed to the imagination, tastes, and even passions of the aborigines, but partly also, and perhaps in greater measure, to the peculiar social relations of the times. In those days the Paulistas in the east, and the Spaniards in the west, were everywhere scouring the land in search of hands for their mines and plantations. They looked upon the natives as their legitimate property, while the natives looked to the missions as their only refuge from their ruthless persecutors. The result was a constant increase of neophytes, received with open arms by the padres, who thereby came to be regarded as "receivers of stolen property." Belonging also to no nationality, they were treated on both sides as aliens and intruders, so that in self-defence they were compelled to arm the congregations not only against the Charruas and other native marauders, but also against their far more terrible Christian foes. They gained several victories over the Paulistas, each time disarming their subjects (over whom Papal bulls had granted them absolute control), either fearing military revolts, or for religious motives.

Such at least was the policy pursued in Paraguay, but not everywhere, and in the Brazilian reductions of Rio Grande all adults received a regular training, mustering every Sunday at the sound of the drum, and going through their exercises with fire-arms, and bows and arrows, and all the manœuvres of attack and retreat. Then the arms were replaced in the arsenal till the next Sunday, and those rewarded who showed progress in the drill. One of the fathers, Matheus Sanches, even headed an unprovoked expedition against the Charruas, whom he wanted to exterminate because they refused to join the missions. Others led "a countless multitude" against

the Spaniards and Portuguese commissioners engaged on some boundary question on the frontiers of their respective possessions, and in other ways played into the hands of their implacable enemies.

Their government was an absolute theocracy, in which they were responsible to nobody, and never troubled even to frame a civil or criminal code, but meted out justice at their own pleasure. If seldom severe they were always stern judges, punishing "venial sins" with prayers, fasts, and imprisonment, serious offences with the lash, recalcitrants being flogged to death, as in Russia. With the theocracy were combined certain communistic institutions, such as the withdrawal of young children from the parental care and their education in large schools under the vigilant eyes of the padres. Here the most rigid discipline prevailed, and the whole machinery was supported by a detestable system of espionage, under which the noblest sentiments of humanity were stifled, and every spark of personal freedom extinguished. Hence after the expulsion of the Jesuits the congregations, possessing no initiative and incapacitated for a free life, rapidly melted away, a prey either to their own excesses or to the attacks of more robust tribal groups. The "Paraguay Missions" of the Middle Parana are now an uninhabited wilderness, and the population of the above-mentioned reductions of Rio Grande had fallen from about 100,000 in 1731 to 7954 in 1814.

The Paraguayans

In the present Paraguayan nation there is said to be a very large strain of Basque blood, so that one authority has proposed to call them "Vasco-Guarani" rather than "Hispano-Guarani." Others have discovered a Teutonic

element, betrayed by the light shade of the hair in many of the women, and attributed to the German free-lances who entered the country with the first Spanish invaders. But however this be, their most marked qualities seem to be docility, which is a racial character, and indolence, which seems to be acquired. In any case the listlessness and apathy of the men is dwelt upon by most observers, while the women are described as not only physically well developed, but also of thrifty industrious habits. It is curious to notice the custom inherited from their Guarani ancestors of always walking Indian file, as when they proceed in the early morning to fetch water from the river, with their great pitchers balanced on their heads. Their single white cotton garment produces a pleasing effect in contrast with their dark complexion. This flowing gown reaches down to the calves, is low-necked and short-waisted, a cord serving the purpose of a girdle.

Many Guarani women are very finely developed, and all have beautiful teeth; yet according to our standard they can scarcely be called handsome, the cheek-bones being too prominent and the chin too square. Their large black eyes are shaded by heavy brows, and their mixed blood is betrayed in their frizzly black and even reddish hair. They are inveterate smokers, and are usually seen with a large cigar in their mouths. Even the little children acquire the habit, and when infants are restless mothers have been seen to soothe them by cramming their mouths with the cigar they have been smoking. The severe discipline enforced by the padres in the reductions appears to have brought about the usual reaction, and casual unions, unsanctioned either by the law or the Church, are now the rule rather than the exception. Nevertheless the devotion of the women to

their temporary partners is undoubted, and by submission they have acquired the control of the household, so that when the unions are dissolved, mostly by mutual consent, the children always follow the mother.

The strangely docile character of the Paraguayans, for which no parallel can be found except perhaps amongst the gentle and inoffensive inhabitants of the Liu-Kiu islands south of Japan, has been attributed to the national diet, which is almost exclusively vegetarian. Many abstain altogether from meat, living entirely on manioc and other vegetables, besides fruits, and especially large quantities of oranges. Although rum of a very fair quality is largely distilled from the sugar-cane, it is prepared mostly for exportation, the general drink of the people being Paraguay tea.

Topography

It was above seen that, since the expulsion of the Jesuits and the dispersion of their congregations there has been a gradual shifting of the populations, from the Parana basin below the Guayra Falls westwards to the Paraguay above Corrientes. Even here urban centres are far from numerous, and the subjoined table shows that in the whole State there are only six towns with over 10,000 inhabitants :—

	Pop. 1905.		Pop. 1905.
Asuncion . .	60,250	Carapegua . .	13,000
Villa Rica . .	25,000	Paraguari . .	10,000
Concepcion . .	15,000	Villa del Pilar .	10,000
San Pedro . .	8,000	Encarnacion . .	4,000
Luque . . .	8,000	Ita	4,000

Asuncion, capital of Paraguay, is also the largest and oldest place in the country. It was founded in 1536 by Ayolas on a terrace 50 feet above the main stream, at

the point where it ceases to be navigable for sea-going vessels. Hence Asuncion must always remain the chief river-side port of the Paraguay river. Before the year 1620 it was the capital of all the Spanish possessions in the Plate region, and after the declaration of independence it was considerably enlarged and partly reconstructed, with several fine buildings, such as the *Cabaldo*, where Congress meets, and the cathedral in the Renascence

PALACE OF LOPEZ, ASUNCION.

style. The huge palace, forming a conspicuous object visible from the port, is an ambitious structure erected by the Dictator, Solano Lopez, who aimed at doing everything in a grand way. His policy, however, eventually ruined the place, and Asuncion, which in 1857 had a population of nearly 50,000, including the suburbs, was found to be completely deserted by the Brazilians when they captured it in 1869 towards the close of the war. Since then it has again prospered, and is now much larger

than ever, though the signs of former decay are still visible in some of its grass-grown streets, all disposed at right angles, but running here and there in some quarters for long distances through open spaces, unrelieved by a single structure of any kind.

Luque, the first important station on the railway running to Villa Rica, may almost be regarded as a suburb of Asuncion, from which it is distant only about 8 miles. For a moment it was even the seat of government after the evacuation of the capital in 1869. But at present it is chiefly noted for its banana and orange groves, which extend nearly all the way to the river. *Paraguari*, also a station on the line 45 miles south-east of Asuncion, stands on the site of one of the missions, which derived an air of sanctity from the neighbouring caves, reputed abode of the Apostle St. Thomas when he came hither to preach the Gospel to the Guarani nation. The present reputation of Paraguari is due to the excellent quality of the tobacco which is grown in the district, and has already found its way to the European markets. About 50 miles beyond this place is the flourishing city of *Villa Rica*, next in size to the capital, and for many years the inland terminus of the railway with which it is connected. It occupies a central position in an extremely fertile district, watered by the Tibicuary-mini—that is, the "Little Tibicuary,"—which, however, is navigable for steam launches all the way to Villa Rica. The numerous head-streams of the Tibicuary descending from the slopes of the neighbouring cordillera all serve to irrigate the extensive manioc and tobacco plantations, which are here encircled by densely-wooded hills. So advantageously situated is Villa Rica, also an old Jesuit foundation, that it is the necessary converging point of all the projected railways which

are so urgently needed for the development of the immense agricultural resources of the country.

In the whole of the Middle Parana basin included in Paraguayan territory the only place that can be called a town is *Villa Encarnacion*, which stands on the main stream 54 miles above the Iacyreta rapids, over against the Argentine town of Posadas. These places have been chosen as the future termini of the lines which are to effect a junction between the Paraguay and Argentine railway systems. But at this point the Parana flows with a very wide and swift current, so that the spanning of the river by a viaduct must prove a costly as well as a difficult undertaking. Encarnacion, the *Itapua* of the natives, was one of the most flourishing of the reductions, founded in 1624, and noted for its magnificent church, the treasures of which were plundered by President Francia.

On or near the Paraguay, above Asuncion, the only places calling for mention are *Villa Concepcion*, on the left bank, just within the Tropic of Capricorn; *San Pedro*, on the Jujuy, 8 miles above its junction with the main stream; and *Villa Hayes*, on the Gran Chaco side, a little above the capital. None of them are at present of any commercial importance, and Concepcion, formerly a great centre of the maté trade, now awaits the projected northern railway to revive its fallen fortunes. Villa Hayes, the only centre of population in Western Paraguay, is named from the President of the United States who, in 1879, awarded this wilderness of North-East Gran Chaco to the republic.

Below Asuncion follow *Villeta*, *Villa Franca*, *Villa del Pilar*, and the dismantled stronghold of *Humaita*, in the order named. Villeta, a few miles west of the thriving little rural town of *Ita*, lies midway between

the *Angostura*, or "Narrows," where the stream contracts to a breadth of scarcely 270 feet, and the *Lambaré* bluff just below Asuncion, which marks the farthest point reached in 1528 by Sebastian Cabot, at that time in command of a Spanish expedition to the interior. The bluff is named from the Payagua chief who here offered a stout resistance to the invaders. Villeta is a sleepy little river-side port, embowered in palm and orange groves.

Villa Franca, a few miles north, and Villa del Pilar, a few miles south of the Tibicuary confluence, lie well within the malarious *bañados*, or "drowned lands," which fill up the whole of the peninsular region enclosed by the main streams converging at the *Tres Bocas*. Nearly midway between Pilar and the confluence rise the famous heights of Humaita, where the Paraguayans held out for two years (1866-68) against the combined land and river forces of the Allies. Then the great river ran with blood, and when the Brazilians stormed *Itapiru* at the confluence, such was the slaughter on both sides that the bodies of the slain floated down-stream for days.

Historic Retrospect—Administration

Paraguay, the "Niobe of Nations," inhabited by the most peace-loving and unaggressive people in the southern continent, has, nevertheless, been the theatre of one of the most sanguinary dramas recorded in history. But the best of qualities carried to excess become vices, and it will be seen that the Paraguayans have to thank their excessive meekness, their "invertebrate character," for all their woes. Till recent times there were no "revolutions," as in the other Hispano-American States; no domestic troubles or party strife, and since the

declaration of independence in 1811 only two foreign wars. The first, entirely justified, was waged successfully against the aggressive Argentines, who, immediately after the expulsion of the Spaniards, wanted to compel the Paraguayans to join the Confederate La Plata States. The second, carried to the point of extermination, was conducted not by the nation, but by a ruthless Dictator, who drove his too submissive subjects like sheep to the shambles in defence of a hopelessly mistaken policy.

Notwithstanding its distance from the Atlantic seaboard, and the impossibility of establishing regular communications with the Pacific, Asuncion promised in early colonial times to become the chief seat of Spanish sway in the Plate regions. The water highway to the great estuary was open; the Guarani people of the surrounding districts were peaceful and well disposed; while the country was safeguarded from the Paulistas and other Brazilian interlopers, at first by the Parana rapids, and later by the missions. But the right bank of the Paraguay remained in the hands of fierce, wild tribes, and it was by some of these that Ayolas, founder of Asuncion (1536 or 1537), was murdered on his return from an adventurous expedition towards Peru in quest of El Dorado. His successor, Martinez Yrala, for a time (1542-44) superseded by the famous Nuñez, Cabeza de Vaca, revived the waning fortunes of the young settlement, and at his death Asuncion was the most flourishing colony in the whole of the Plate basin. Then followed a period of anarchy, after which the "province of Paraguay" became little more than a geographical expression, as a dependency of the Viceroy of Peru. Later, this province, which had originally comprised the whole region as far as, and inclusive of, Buenos Ayres, was included in the Viceroyalty of Rio de

la Plata constituted in 1776. During the revolutionary period Paraguay alone achieved its independence without bloodshed. The last Spanish governor, Bernardo Velasco, yielded to the will of the people in 1811, when a triumvirate, including Dr. José Gaspar Francia, was placed at the head of the administration.

After the above-mentioned war against the Argentines, who were defeated at Paraguari, and again on the banks of the Tucuari, the reins of government were seized by Francia, who was declared Dictator in 1814, and ruled with extraordinary vigour and rigour till his death in 1840. By Francia was first adopted the fatal policy of seclusion, the object of which was to preserve the political integrity of the republic against the Argentines and others by closing the navigation of the Paraguay, and cutting off the country from all intercourse with the outer world. *Paraguay farà da se* ("Paraguay shall stand alone"), the dictum of later Italian politicians, might be taken as the watchword of this policy, which brought Paraguay to the verge of ruin by exciting the hostility of all the surrounding states, who were naturally opposed to the closing of the great waterway flowing also through their territories. Under Francia's successor, Vibal (1840-44), all foreigners continued to be excluded. The same system of isolation, with certain necessary modifications, was persisted in by Francia's nephew, Carlos Antonio Lopez (1844-62), and by this dictator's son, Francisco Solano Lopez (1862-70), who organised the whole nation on a military basis, and aimed at the complete control of the main stream by erecting the strongholds of Olimpo and Humaita on the Paraguay, and then jointly with Uruguay seizing the island of Martin Garcia commanding the Parana delta. But Brazil, acting in concert with Argentina, soon com-

pelled Uruguay to withdraw from its alliance with Lopez, who thus found himself confronted by all three Powers when hostilities broke out in 1865. Here is not the place to enter into the details of the terrible war which was maintained by the Dictator single-handed for five years against overwhelming odds, and ended with his final overthrow and death by an Argentine spear-thrust at Cerro-Cora on March 1, 1870. Suffice it to say that the Allies dealt leniently with the heroic survivors, and, after the inevitable readjustment of frontiers, recognised the political independence of Paraguay.

The Treaty of Peace (August 1870) was followed by the declaration of a new Constitution on liberal principles, the legislature being vested in a Congress of two Houses elected directly by the people, and the executive entrusted to a President elected for four years, and aided by a Vice-President and a Cabinet of five responsible ministers. Since then there have been some political troubles; but, on the whole, the Constitution has worked fairly well, and Paraguay appears to have now entered on a period of rest and material prosperity. The revenue and expenditure are generally balanced at about £1,510,000, while the outstanding debt amounted to £846,000 in 1907. There is now no army to provide for beyond a small force of about 1100 men, maintained chiefly to preserve internal order.

Catholicism is the State religion, the free exercise of other forms of worship being permitted. Education is free and compulsory, and in 1908 the elementary schools were attended by 25,000 pupils; but at that date only 20 per cent of the native adult population could read and write. Instruction is imparted both in Guarani, which is still generally spoken, and in Spanish, which is the official language of the country.

CHAPTER XIV

BRAZIL

Extent—Frontier Questions—Area—Population—Ethnical Elements of the Population and their Distribution—Physical Features—Seaboard, Headlands and Islands—Orography—The Serra do Mar—The Serra do Espinhaço—The Western Serras, Plateaux, and Campos—Geological Formations—The Brazilian Lowlands and Woodlands—Hydrography—The Amazon—Estuary—Lateral Channels and Islands—The Amazonian Affluents—The Jurua, Purus, and Madeira—The Tapajos, Xingu, and Tocantins—The Rio Negro and other Northern Affluents—The S. Francisco and other Coast-Streams.

Extent—Frontier Questions—Area—Population

"The United States of Brazil," as this vast commonwealth is officially designated, ranks for size amongst the Great Powers in the world, being exceeded in superficial area only by the British, Russian, and Chinese Empires, and the United States of North America. Comprising rather more than one-half of the southern continent, it is somewhat larger than all the Hispano-American States, together with the Guianas, and is even conterminous with all of them, Chile alone excepted.

Most of the long pending frontier questions have now been settled. Thus, by the award given by the King of Italy in June 1904, the boundary towards British Guiana runs from the source of the Kotinga along the water-parting east to the source of the Ireng or Mahu, and down this river to the confluence of the Takutu,

which it ascends to its source, that is, to the undisputed part of the frontier as fixed in November 1901. For Dutch Guiana a treaty was signed in May 1906, but awaits ratification, and in April 1907 the frontier towards Columbia was drawn from Cucuhy on the Rio Negro to the confluence of the Apaporis and Yapura. But farther south a final arrangement is postponed pending a settlement of the contested claims of Colombia, Ecuador, and Peru in the Putumayo region, where proceedings were still in progress in 1908. Towards French Guiana the whole region between the Araguay and the Oyapok rivers has long been a subject of litigation, both sides basing their claims on an obscurely worded article of the treaty of Utrecht. But in April 1897 the question was referred to the Swiss Government, which, in December 1900, assigned to Brazil nearly the whole of the contested territory. Nearly all points in dispute with Argentina were settled in February 1895 by President Cleveland of the United States, to whose decision the matter had been submitted by the litigants. Here the frontier is formed by the San Antonio affluent of the I-Guazu and the Pepiri Guazu affluent of the Uruguay from their confluences to their sources, and then by a line drawn from source to source of these rivers.

Between French Guiana and Uruguay the Brazilian seaboard develops a vast eastward bend, which at Cape S. Roque approaches nearer than any other point of the new world to the eastern hemisphere. This coast-line, which is diversified by few islands or deep inlets except at the Amazon estuary, Bahia, and Rio, has a total length of 5900 miles. As the landward frontiers are estimated at over 10,000 miles, the periphery has a total length of perhaps 16,000 miles, including all those

tracts which till lately were the subject of litigation with the neighbouring States.

But within its undisputed limits, Brazil has a superficial area of nearly 3,220,000 square miles, with a total population of 14,334,000, as at first returned by the census of 1890, but afterwards raised to 16,330,000 by an official revision of the main results. According to the previous census of 1872 the population was 9,930,000 at that date. From the subjoined table of the areas and populations of the twenty-one States for 1900, it will be seen that the vast majority of the inhabitants are still concentrated in the eastern parts of the republic, that is, on the Atlantic seaboard :—

States.	Area in sq. miles.	Population (1900).
Amazonas	732,439	649,273
Para	443,903	445,356
Maranhão	177,561	499,308
Piauhy	116,523	334,328
Ceara	40,247	849,127
Rio Grande do Norte	22,195	274,317
Parahiba	28,854	490,784
Pernambuco	49,573	1,178,150
Alagoas	22,583	649,273
Sergipe	15,093	356,264
Bahia	164,643	2,117,956
Espirito Santo	17,312	209,783
Federal District	538	746,749
Rio de Janeiro	26,634	926,035
S. Paulo	112,307	2,279,608
Parana	85,451	327,136
Santa Catharina	28,632	320,289
Rio Grande do Sul	91,333	1,149,070
Minas Geraes	221,959	3,594,471
Goyaz	288,536	255,284
Matto Grosso	532,685	118,025
Total	3,218,991	17,371,069

Ethnical Elements of the Population and their Distribution

Here we see that the three great inland States of Amazonas, Goyaz, and Matto Grosso, with an area of over 1,500,000 squares miles, have a collective population of less than 625,000, whereas the twelve more important Atlantic States, with an area of less than 1,310,000 square miles, have a population of nearly 13,500,000, while the Little Federal District, a few hundred square miles in extent, has three times more inhabitants than the vast province of Amazonas, which is more than one-sixth the size of Europe. Such a distribution, taken in connection with the relatively slight density of the population generally—under six persons per square mile—simply means that the greater part of the interior still consists mainly of unsettled backwoods, while even the long-occupied coast region is still but thinly peopled—not more than ten persons per square mile. It has been calculated that, were Brazil as densely peopled as Belgium, it would contain upwards of 1,600,000,000 inhabitants, that is, more than the whole world, according to the latest estimates.

As regards the constituent elements of the population, Brazil differs in some important respects from all the Hispano-American States. In these, broadly speaking, there are only two elements—the aborigines and the Europeans—who are for the most part merged in varying proportions in dominant nationalities of Spanish speech. Here and there—Peru and Bolivia—the fusion is far from complete; but, speaking roughly, it may be regarded as well advanced, so much so that, in all forecasts of the destinies of Spanish America, it has to be accepted as an established fact. "For better for worse,"

the two races are here welded together in a new ethnic family for all time to come, the one important exception being Uruguay and the adjacent parts of Argentina, where the aboriginal element is least pronounced, or even in process of elimination.

In Brazil the relations are different. In the first place we have here three distinct elements—the aborigines, the Negroes, and the Europeans—and these also are merged in varying proportions in a mixed Lusitano-American nationality, which has hitherto been dominant and is of Portuguese speech. But, in the second place, the triple fusion is not universal, but mainly confined to the Atlantic States between the Amazon estuary and Rio de Janeiro, that is, to those lying within the torrid zone. Here is the true home of that section of the Brazilian people, in which are represented all the endless and indefinable shades of transition between the three specified races, as roughly indicated in the table of Mestizo terminology at p. 64. Then follow the Southern States of S. Paulo, Parana, Santa Catharina, and Rio Grande do Sul, with which, because of its great altitude and special historic development, must be grouped the vast and relatively populous region of Minas Geraes. Here we have no "triple fusion," the negro element being everywhere mainly absent, but, as in Spanish America, an amalgam of aborigines and whites, represented chiefly by the already described Paulistas (p. 62). These Paulistas, forming the bulk of the population in Minas Geraes, and in all the early settlements of the conterminous western and southern regions, constitute the second section of the Brazilian people, distinguished from the first by the absence of black blood. Lastly, the aboriginal element tends to disappear in the direction of the south, where the white element is continually strengthened by

direct accessions from various parts of Europe, but especially Italy, Portugal, and Austria. In Rio Grande do Sul there were fifteen European colonies with a collective population of 110,000 out of a total general population of 880,000 in 1890, and between the years 1855 and 1904 as many as 2,096,000 European emigrants settled in Brazil, the vast majority in the southern States. During the period from 1873 to 1886, for which alone full accurate returns are available, the immigrants numbered 304,796, distributed as under:[1]—

Italians . .	112,279	French . . .	3,475
Portuguese . .	110,891	British . . .	2,215
Germans . .	23,469	Swiss	479
Spaniards . .	15,684	Russians . . .	417
Austrians . .	9,022	Sundries . . .	26,868

Since then the relative positions of these nationalities have undergone some change, and the Austrians, for instance, are now much more numerous than the Germans. But the superiority of South over North Europeans remains as great as ever, or even tends to increase, as in the year 1896, when the immigrants of Latin speech, mainly Portuguese, Spanish, and Italian, numbered about 140,000, and others (Germans, English, Magyars, etc.) only 17,000. It is further to be noticed that some of the lands where these immigrants settle lie within or just beyond the Tropic of Capricorn (S. Paulo, Parana), and are consequently more suited for South than for North European settlement. Hence the hopes at one time entertained by the Germans of establishing themselves permanently and independently in South Brazil, and even of here creating a "Neudeutschland," seem already dispelled. They can only enter, with the English and other Teutons, as a secondary element of minor

[1] Oskar Canstatt, *Das Republikanische Brasilien* (1899), p. 637.

importance, into the general blend, which is now in progress, and promises to result in a third section of the Brazilian people, differing from the two others in the absence both of Negro and of aboriginal blood. But an analogous process is simultaneously going on in the adjacent Argentine and Uruguayan lands, the only difference being that here Spanish takes the place of the closely allied Portuguese, as the dominant linguistic factor. Thus is being formed, in a mainly temperate region, about one-fourth the size of Europe, a new ethnical group of nearly pure Mediterranean (South European) stock, capable of almost unlimited expansion, and destined perhaps to serve in the south as a set-off to the Anglo-Saxon predominance north of the equator. At least in the face of such an expansion present political frontiers cease to be of weight, except perhaps to indicate the future frontiers of a great Latin confederacy created "to redress the balance of the north."

In the absence of later returns, the present proportions of whites (using the term in an elastic sense), blacks and aborigines can only be approximately estimated from the census of 1872, when those classed as whites numbered 3,787,000; Mestizos, 3,802,000; Negroes, 1,955,000; and Indians, 387,000. A calculation made on this basis, with some later documentary evidence, gives the population for 1907 according to races as under :—

Pure whites, mostly South Europeans	2,400,000
Reputed whites, with slight Negro or Indian strain	2,700,000
Full-blood Negroes, chiefly from Angola and Upper Guinea	2,300,000
Other half-castes of all shades	8,800,000
Semi-civilised or settled Indians	450,000
Wild or Independent Indians	350,000
Total	17,000,000

In general the pure whites are dominant in the southern extra-tropical States, the reputed whites in Minas Geraes and all the large centres of population, the half-castes forming the substratum almost everywhere, while the Negroes are mainly confined to the north-east Atlantic States, and the Indians to the States of Para, Goyaz, Matto Grosso, and Amazonas.

The various main sections, as above defined, may now be roughly determined, as regards their respective area and populations, as under :—

Sections.	Domain.	Area.	Pop. (1907).
I White, Indian, and Negro blends, and full-blood Negroes.	North-East Atlantic States, mainly, but including Rio de Janeiro.	900,000	5,600,000
II White and Indian blends.	Minas Geraes, parts of S. Paulo and neighbouring lands.	500,000	8,100,000
III White blends (S. Europeans mainly).	Parts of S. Paulo and Rio de Janeiro, Parana, Sta Catharina, Rio Grande do Sul.	300,000	2,500,000
IV Full-blood Indians.	Amazonas, Matto Grosso, Parts of Goyaz and Para, mainly.	1,600,000	800,000
	Total	3,300,000	17,000,000

Physical Features—Seaboard—Headlands and Islands

In its main outlines Brazil presents a curious resemblance to the Southern Continent, of which it forms the eastern section, and in which it appears as if encapsulated, like a box within a box. Thus both are of irregular triangular shape, with sides partly coinciding,

partly overlapping, broadening out in the north and tapering steadily southwards. The resemblance in general outline is well seen by following the contour line from the Sierra de Santa Marta to Cape S. Roque, and then from this headland to Fuegia, where in the north the general trend of the continental seaboard is continued beyond the Guianas by that of Brazil, while in the south the Brazilian seaboard is continued beyond Rio Grande do Sul in the same normal direction to the extremity of the continent.

On the whole the Brazilian seaboard maintains the same monotonous aspect as that of the rest of the continent. The headlands—*Orange, do Norte, Raso, Branco, S. Agostinho, S. Thomé, Frio*—stand out perhaps in somewhat bolder relief. Patriotic geographers also enumerate as many as forty-two natural havens. But very few of these can be regarded as good harbours. The safest and most commodious, taking them in the direction from north to south, are *Para, Maranhão, Parahiba, Pernambuco, Maccio, Aracaju, Bahia, Ilheos, Santa Cruz, Porto Seguro, Victoria, Rio de Janeiro, Santos, Paranagua, Santa Catharina, Rio Grande do Sul.* In this respect the least favoured by nature is the north coast which, besides the want of convenient seaports, suffers also from the presence of dangerous shoals and quicksands. Here the fluvial estuaries are mostly obstructed by the so-called "stone-reefs," which have been studied by Prof. J. C. Branner of Harvard, who describes them as long, narrow fringes of quartzose sand cemented by carbonate of lime, running for miles from headland to headland, but only a few yards wide and a foot or two above mean tide level. Under the influence of the trade winds setting from the east they accumulate about the estuaries, but are quite distinct from the coral

reefs which also occur and are of two species peculiar to the Brazil waters.

Apart from the fluvial formations in the Amazon estuary—*Marajo* (*Joannes*), *Mexiana, Caviana*—the only islands worthy of the name are *Itaparica* at Bahia Bay; *Grande,* south of Rio de Janeiro; *Sebastião,* on the coast of S. Paulo; *S. Francisco,* below Paranagua Bay; and *Sta Catharina* on the coast of Santa Catharina, all lying close to the mainland, of which they are merely detached fragments. Politically to Brazil belong also the oceanic islets of *Fernando Noronha,* north-east of Cape S. Roque; the *Abrolhos* and *Trinidad,* with *Martin Vaz,* east by north of Rio de Janeiro. Fernando Noronha, so named from its first Portuguese colonist, is about 5 miles long and nearly 2 miles broad, and terminates in the "Pyramid," a lofty peak rising above the surrounding woods. The island is mainly of volcanic origin, and the neighbouring reefs partly of coralline formation. Its rocky soil being scarcely cultivable, Fernando Noronha is used by the Brazilian Government exclusively as a penal settlement. The convicts appear to be employed chiefly in hunting down the myriads of rats, which have overrun the island since their introduction some years ago.

The *Abrolhos,* or *Santa Barbara,* form a group of five islets and numerous reefs, which lie about 34 miles from the coast between Bahia and Rio de Janeiro. They are the "Manacles" of Brazil, being much dreaded by skippers, as appears from their name, *Abra os Olhos* ("Keep your eyes open"). Santa Barbara, the alternative name, is taken from the largest member of the group, which is about a mile long, but, like all the others, rocky, and destitute of spring water and vegetation.

Trinidad, or *Ascensão,* 680 miles east of the coast of Espirito Santo, is important enough to have formed a

subject of contention between Brazil and Great Britain. Yet it is less than 4 miles long, and only 2 miles broad, and its only inhabitants are wild cats and goats. But Trinidad, also called *Ascensão*, because discovered by Tristam da Cunha on the feast of the Ascension, may have a prospective value either as a coaling or a telegraph station.

Orography—The Serra do Mar

Brazil is, broadly speaking, divided into two great physical regions of unequal extent—the eastern and central uplands, which represent all that now remains of the ancient Brazilian highlands, and the northern and western lowlands, which have replaced the ancient inland sea. The uplands, which are thus completely isolated by low-lying and mostly wooded plains, may be described as an undulating plateau, falling somewhat abruptly towards the Atlantic, and stretching in long gentle inclines inland towards the Amazon and Parana basins. Here the land stands at a mean elevation of about 3000 feet, scarcely anywhere falling below 2000 or rising above 5000 feet, except in the fragmentary mountain ranges by which it is traversed mainly in the direction from south to north. Three such irregular chains, which in places assume the aspect rather of high plateaux than of true ranges, follow in roughly parallel lines from the Atlantic seaboard inland, while a fourth bends round in Matto Grosso from south to west between the waters flowing north to the Amazon and south to the Paraguay basin.

In the extreme south, where, as already described, the whole region tapers nearly to a point, the outer meridional chain takes the name of the *Serra do Mar*, that is, the "Coast Range," and although approaching

close to the shore, forms nevertheless the true divide towards the Parana basin. Thus the traveller, climbing the heights at Santos and some other points, finds on reaching the plateau that he has also reached the sources of the Rio Grande and other streams all flowing westwards to the Parana or to the Uruguay. But between these streams and those which farther south trend east to the large coast lagoon known as the Lagoa dos Patos, there stretches a broken tableland which is connected southwards with the Cuchilla Grande of Uruguay, and is skirted northwards by a ridge bearing the same name in Portuguese,—*Coxilha Grande.* Around this tableland other short chains radiate in all directions, while the Serra do Mar, called also *Serra Geral* ("Main Range"), continues to follow the coast-line through the States of Santa Catharina, Rio de Janeiro, Espirito Santo and Bahia, its different sections being locally known as *The Organs,* the *Serra dos Aimores,* and by other designations.

The Organs, so named from the fanciful resemblance of their weathered cliffs to the pipes of a great organ, present a singularly imposing and romantic aspect, when viewed from the land-locked waters of Rio de Janeiro. "Between the northern shore and the foot of the mountains is a level swampy tract, evidently filled up by the detritus borne down by the numerous streams, and beyond this the mountain range rises very abruptly from the plain. It is towards its eastern extremity that the Serra shows that remarkable series of granitic pinnacles of nearly equal height, appearing vertical from a distance, that suggested the likeness to the pipes of an organ, whence these mountains obtained their name. The height of the loftier part has been estimated at 7500 feet above sea-level."[1]

[1] Ball, *op. cit.* p. 326.

But, according to Liais, the highest points scarcely exceed 6650 feet, although the main range maintains a considerable elevation as far north as the plains of Campos and the mouth of the Parahiba do Sul, where the *Frade de Macahé* peak, 5700 feet high, is visible a long way seawards. The detritus referred to by Ball appears to be at least partly of morainic origin, boulders, shingle, and gravels deposited by the glaciers which formerly descended down to the plains. The finer débris, probably due to erosion, is all bound together by a red earth similar to that which covers large tracts in Paraguay and S. Paulo, and is found to be specially suitable for the cultivation of coffee.

The Serra do Espinhaço

Beyond the Parahiba do Sul stretches the second meridional chain, the *Serra da Mantiqueira*, called also the *Serra do Espinhaço*, that is the "Spinal Range," which is in fact the "Backbone" of the Brazilian system. Beginning north of S. Paulo and of the Tieté Valley, under the name of the *Serra de Cantareira*, it rises gradually in the direction of the north-east, and nearly due west of Rio de Janeiro culminates in the *Itatiaya Peak*, which, although falling below 10,000 or perhaps even 9000 feet, is nevertheless generally regarded as the loftiest summit in the whole of Brazil. It is said to be a long extinct volcano, and Burton even speaks of two craters, sulphur beds and sulphurous springs as still visible, surmounted, however, by the *Agulhas Negras*, or "Black Needles," three sharp peaks flecked with snow for a few days every winter.

Beyond Itatiaya the Mantiqueira range bends round to the north, and east of Barbacena, where it is known

as the *Serra do Sapateiro*, and throws off a number of branches radiating in various directions over the central plateau. While the main range continues its northerly trend, another chain, variously known in its different section as the *Serra de Macaco*, the *Serra de S. Geraldo*, the *Serra de S. Sebastião*, and the *Serra do Brigadeiro*, converges north-eastwards in the coast system. A third branch, running west, has received the name of the *Espigão das Vertentes* ("Crest of the Watersheds"), because it forms the divide between the S. Francisco basin in the north and the Parana in the south. In the same Barbacena knot two other fluvial basins have their origin—that of the Rio Pomba, a south-easterly affluent of the Parahiba do Sul, and that of the Rio Doce, which runs north-eastwards to the Atlantic.

North of the Barbacena knot, which is certainly one of the chief centres of dispersion for the Brazilian rivers, the Serra do Espinhaço runs at a mean altitude of about 4000 feet for a distance of nearly 200 miles in the direction of the north through the rich mineral region of Minas Geraes. In this section the loftiest peaks are *Itacolumi*, just south of Ouro Preto (5750 feet), and *Itambe*, a little east of Diamantina (4350 feet). Itacolumi, that is, the "Giant," gives its name to the peculiar laminated quartz formation, which covers vast spaces in Brazil, and in some districts yields both gold and diamonds. Itambe, sometimes wrongly described as the highest peak of the Espinhaço range, was ascended in 1899 by Mr. H. D. Beaumont, not, however, for the first time. Although the natives of the district had no tradition of any previous ascent, it was certainly scaled early in the nineteenth century by the German explorers, Spix and Martius.[1]

[1] *Geograph. Jour.* June 1899, p. 662.

From Itambe is thrown off north-eastwards, between the Doce and Juquitinha valleys, the *Serra do Chifre*, which is still for the most part unexplored, but is known to converge with the Serra dos Aimores beyond the Rio Mucury Valley. North of Diamantina the Espinhaço is still continued under various names, such as the *Serra do Grão Mogol*, the *Serra Branca*, the *Serra das Almas*, the *Serra Preta*, the *Serra Chapada Diamantina*, as far as the great easterly bend of the Rio S. Francisco. Here the Serras merge in a high plateau, which is traversed by a fluvial valley with a douple incline affording a continuous waterway between the S. Francisco and Tocantins basins. The whole of the region between the S. Francisco and the Atlantic presents the aspect of a very old plateau, which has been greatly reduced by erosion, and carved by the running waters into distinct sections, which affect the appearance of low mountain ranges disposed in various directions. Thus at Cape Trio, terminal point of the Serra do Mar proper, this maritime range consists of "great scarped hills of granitic gneiss; hoary, time-worn, and weather-beaten defenders of the coast-line against the encroachments of the sea."[1]

The Western Serras, Plateaux, and Campos

West of the Rio S. Francisco other somewhat similar crests, originating in a plateau which is connected by the *Serra das Vertentes* with the Espinhaço, are developed parallel with, but at a lower elevation than, the "Backbone." Here the *Serra da Canastra*, the *Serra das Araras*, the *Chapada das Mangabeiras*, the *Serra de Piauhy*, follow in the direction of the north and north-east, throwing off lateral spurs between all the river

[1] J. W. Wells, *Three Thousand Miles through Brazil*, vol. ii. p. 362.

valleys and in places broadening out into elevated plateaux.

West of the Araguaya, that is, the great western branch of the Tocantins, the same general conformation is reproduced. Here the Goyaz plateau, which is traversed by the *Perinéos* (*Pyrenees*), with their many ramifying offshoots, forms a western continuation of the Vertentes, and develops farther west the *Serra de Santa Martha,* which throws off one branch between the Araguaya and Xingu Valleys, and another southwards to the Sierra de Mbaracayu on the Paraguay frontier. Between the sources of the Xingu and Tapajos in the north and those of the Paraguay and its head-streams in the south, the water-parting takes the name of the *Serra do Pary* or *Diamantina,* and this low range traverses the Matto Grosso plateau as the *Cordilheira dos Parexis*—(*Parecis*), and the *Cordilheira Geral* mainly in a westerly direction all the way to the great falls of the Madeira.

It is noteworthy that these "Serras" and "Cordilheiras" are also locally called "Campos"—*Campos dos Parexis* about the numerous head-waters of the Tapajos and elsewhere. They are in fact not so much true ranges as the steep rocky escarpments of the great central tableland, which merges gradually northwards in the Amazonian plains, and falls abruptly southwards down to the Paraguay basin. Hence to those dwelling to the south they look like long mountain ranges of moderate altitude, and are by them called Serras and Cordilheiras, while for the inhabitants of the northern slopes they are nothing but *Campos,* scarcely to be distinguished from the surrounding open and undulating plateaux, which are known by this name throughout Central Brazil.

But these upland campos or *chapadas,* which have a general incline towards the encircling Amazonian low-

lands, differ greatly in their main features, according to their latitude and height above the sea. But all alike present in their herbaceous or scrubby vegetation, or else their park-like appearance, with isolated clumps of trees dotted over the grassy plains, the sharpest contrast to the primeval woodlands of the seaboard and especially of the Amazonian lowlands. The natives distinguish between the *campos cerrados* ("closed plains"), with numerous small groves, woods, or thickets, and the *campos abertos* ("open plains"), where little is to be seen except herbaceous or scrubby growths. But the campos are all everywhere traversed by chains of low and generally rounded hills, and furrowed by broad rather than deep river-beds. In some isolated districts they even present the same monotonous aspect as the Argentine pampas or the Venezuelan llanos. As a rule the campos abertos stand at a higher altitude than the cerrados, where the pasture-lands are interspersed with clusters of low trees or shrubs.

In general the Brazilian uplands may be described as level, ridged, or undulating land "covered with grass only in places, or in others by grass, bush, flowering plants, cacti, and dwarf palms, or by the *cerrados*, a name that cannot be rendered in English, as there is nothing in Europe to correspond to it; practically it means thick bush, having much the appearance of a wild neglected English orchard, overgrown with underwood, bushes, and grasses; the trees are small, extremely distorted, and much scattered; they are of extremely hardy varieties, and resist equally heat and cold, wet and drought. These campos lands often extend over great areas; in Goyaz one can travel for several days through such lands without once sighting forest of any kind. The atmosphere of these campos,—the savannahs or

prairies of Brazil, is most delightful and exhilarating. To thoroughly appreciate it one must have resided for some time amidst the dark gloom of the forests, in their damp humid air, impregnated with the myriad odours of fragrant or offensive plants, and of rotting vegetation, and then emerge, like from night to day, on to these bright breezy uplands, sparkling with sunlight, gemmed with flowers, fragrant with sweet perfumes, and lively with the sounds of birds,—whistling, screaming, and warbling a noisy concert,—then how one will feel revived, and take in the pure, serene atmosphere, full of ozone, eagerly and with boyish inclinations to shout, to gallop your horse, anything to express your feeling of ecstasy and delight. From the savannahs of Roraima right through Brazil to its southern provinces is found on these uplands this glorious atmosphere. But delightful as it is, this campos land is considered, north of the latitude of Ouro Preto, unfit for anything but pastoral purposes. South of this division the soil improves in richness and moisture, and much of it can be adapted to the cultivation of cereals" (Wells, vol. ii. p. 372).

In many places, and especially in the southern provinces, the long lines of serras, rising little above the level of the plateau, form far less conspicuous objects in the landscape than might be supposed from their local designations. Thus in the State of S. Paulo the observer is especially struck by the insignificant appearance of the "mountains," to which his attention is drawn by the native guides. "I saw nothing," writes Mr. Ball, "that would elsewhere be called a mountain range. The outlines were in most places rounded and covered with vegetation; but at intervals occurred steep conical masses, of the same general type as the sugar-loaf peaks surrounding the Bay of Rio de Janeiro. However steep,

the rocks nowhere showed angular peaks or edges, these being always more or less rounded" (p. 313).

Geological Formations

As in so many other parts of the Brazilian uplands, these southern plateaux appear, beneath the crust of vegetable soil, to consist entirely of reddish arenaceous deposits resulting from the erosion and decomposition of the prevailing gneiss or granite rocks. Thus in the valley of the Parahiba do Sul thick beds of the same coarse-grained, red arenaceous deposits are everywhere to be seen, while on the slopes of the hills the same material lies like so much talus at the base of the round granite masses higher up. That such is the true origin of the red earth, which was at one time associated with the phenomenon of glaciation, appears evident from its constituent elements and diffusion over an immensely wide area. "The substance and formation of this material may be described as a sheet of red, unstratified clay, interspersed with pebbles, and boulders overlying the rock in place. The stiff, soft clay contains within itself all the mineralogical elements usually found in old metamorphic rock, such as granite, gneiss, mica, clay-slate, etc.; the boulders are usually masses of a kind of greenstone, composed of an equal amount of greenish-black hornblende and felspar, and they are entirely foreign to the rocks they often rest upon" (Wells, vol. ii. p. 373). The absence of sedimentary remains is most remarkable, and must be accepted as a conclusive proof of the great age of the geological formations throughout most of the Brazilian uplands.

A general survey of the whole region shows that the prevailing formations may be reduced to three groups—

primitive, transitional, and tertiary. The primitive rocks occur especially in the Serra do Mar, which for 600 or 700 miles forms the seaward escarpment of the plateau between Pernambuco and Uruguay. In the Espinhaço, where gold and diamonds chiefly abound, the higher strata would appear to consist largely of Silurian and even older sedimentary rocks. But gneiss and granites, including Syenite, are the main constituents of this range, where they are in association with talcose slates, flints, and micaceous schists, and in general those above-mentioned quartz formations known as itacolumite. To the prevalence of gneiss are due the pyramidal and jagged peaks of the cliffs in the Serra do Mar, while the more rounded, dome-shaped summits betray the presence of granites in the Espinhaço system. Farther inland the plateau consists mostly of primitive schists, talc, quartzites, hornblende, granulated limestones, itacolumite and *itabirite*, that is a micaceous variety of hematite, like the specular schists of the Carolinas, named from Mount Itabira north of Ouro Preto.

Tertiary formations occur both as marine and fresh-water deposits, the former along the inlets between Bahia and Rio de Janeiro, the latter at several points along the coast of S. Paulo. On the seaboard are also met the Old Red Sandstones, which prevail so largely in Goyaz and Maranhão, and are in places highly auriferous. Gold is found also in association with common iron-pyrites in the quartzite rocks, and is washed down with the sands of many rivers, while diamonds occur more commonly in the coarser gravels. The extensive sandstone rocks in Matto Grosso and other little known regions appear all to belong to the earlier periods. A widely-diffused deposit is the so-called *Canga*, a conglomerate of all kinds of primitive and later elements formed by

the weathering and erosion of the old Brazilian highlands. This canga is met not only in the river valleys and on the low-lying plains, but also on the slopes of the hills and even on the crests of the mountain ranges, covering them with a blackish incrustation. The same formation occupies wide areas in Goyaz, S. Paulo, and Matto Grosso, as well as in many parts of Argentina.

Recent surveys have revealed in Pernambuco the presence of iron, besides gold, silver, antimony, agates, and coal. Mineral waters with highly curative qualities come to the surface in many places, and are specially copious at Lagoa Santa, in the valley of the Rio das Velhas, Minas Geraes. But Lagoa Santa and the neighbouring district of Cantagallo in the State of Rio de Janeiro are more famous for their numerous sandstone and limestone caves, where have been found vast quantities of the remains of now extinct animals, including those of man himself. Here have been discovered as many as 100 species of mammals and 30 of reptiles, birds and the like, amongst them the megatherium, a huge ape, a jaguar twice the size of the living species, a cabiai as large as a tapir, and a horse like that of the Old World, although everywhere extinct in America before the discovery. All these were in close contact with fossil man, while in the Sumidouro caves were brought to light the remains of over thirty human beings, together with numerous stone implements rudely fashioned, like those of the Old Stone Age in Europe and North Africa. All the skulls except one were of the long-headed type, like that of the Botocudos, Tehuelches, Fuegians, and other aborigines still surviving in the southern continent.

Besides those of Lagoa Santa, numerous other springs, especially chalybeates, occur in other parts of Minas Geraes, as well as in Rio de Janeiro, S. Paulo, Maranhão,

Piauhy, Rio Grande do Norte, Espirito Santo, and elsewhere. Nearly all contain iron in solution with an excess of carbonic acid, and many have a pleasant taste, while fully as efficacious as those of Europe. The much frequented hot sulphur springs of Caldas in Minas Geraes have even the reputation of being the best in the world, especially for rheumatic and scrofulous affections. It is noteworthy that although thermal sources, some with a temperature of 100° or even 120° Fahr., are far from rare, no volcanoes, with the doubtful exception of Itatiaya, have yet been discovered in any part of Brazil. This region is also free from underground disturbances, although a few slight earthquake shocks were for the first time recorded at various points of Santa Catharina in the year 1898.

The Brazilian Lowlands and Woodlands

But all such phenomena belong entirely to the eastern section of Brazil, to the region that has here been defined as the *Brazilian Uplands.* This region, whose western limits are somewhat roughly indicated by the middle course of the Madeira about the Great Falls, differs in a very marked degree from the north-western section of Brazil—the *Brazilian Lowlands,* which were to a large extent comprised within the limits of the ancient inland sea. Politically the lowlands include the whole of the state of Amazonas, with the greater part of Para and Maranhão, that is to say, the valley of the Amazon with the lower courses of its northern and southern affluents, the lower Tocantins and the neighbouring coast-streams as far as the Parahiba do Norte. They stand at a mean altitude of probably less than 400 feet, rising in the extreme north (Brazilian Guiana) and in the extreme

south (Matto Grosso, Goyaz) to 1000 feet and upwards and comprising about one-fourth of the republic, or somewhat over 800,000 square miles.

This immense region, traversed by the largest fluvial system and still clothed with the largest virgin forests of the globe, and almost as level and uniform as the marine waters which it has displaced, is physiographically distinct not only from the Brazilian Uplands, but in many respects from the rest of the continent. Fringed north and south by escarpments of primitive and Archæan origin, and disposed transversely to the general trend of the mainland, the great Amazonian depression is emphatically a new land, covered everywhere with deposits of recent formation. Even the sandstone hills which rise here and there above the surface are relatively modern, or at least younger than the rocks of the Guianas and the eastern uplands. Many present perfectly smooth and level summits like polished tables, and appear to have been formerly continuous over vast spaces, their present isolation being due, according to Agassiz, to a prodigious amount of denudation. The unbroken surface formed originally a vast flooded plain which has been deeply furrowed and eroded, nothing now remaining except those isolated fragments, hard enough to resist the action of the waters by which all the rest has been swept away.

To the observer ascending the Amazon, these table-topped heights form a conspicuous feature of the landscape, especially about and above the Tapajos confluence, at Ereré and Obidos on the left bank and near Santarem on the opposite side. Here the main stream is confined to a relatively narrow channel by the opposing cliffs, through which it appears to have carved a passage seawards (see p. 14). "Strange and interesting as is the

appearance of these cliffs, 1000 feet high, they are not exceptional to the basin of the Amazon. At its farthest western extremity in the Serra de Cupati, bordering the banks of the Rio Japura, and also in the western face of the Chapada da Mangabeira, are encountered identical formations, and even to the north in Roraima, and its brother, Kukenam, also exists a somewhat similar appearance. These great precipitous bluffs and isolated table-topped hills are indicative, or at least suggestive, of a great denudation that has either long since occurred or is yet happening" (Wells, vol. ii. p. 336).

But the most striking feature of these boundless wooded plains is the superabundance of the liquid element, so much so that the Amazonian depression might in a sense be almost described as a terraqueous domain. Next to this wilderness of waters, its most distinguishing character are its interminable woodlands. Nowhere else in the world is there so vast and continuous an extent of arboreal growths. With the exception of a few miles of roadway about the large towns, with difficulty kept free from the rank vegetation, the whole of this wooded zone is absolutely trackless and almost sunless. Hence the singular habit acquired both by plants and animals to assume the character of creepers and climbers, to struggle upwards, as it were, in search of light and air. This tendency, forced upon them by their surroundings, is shared by many vegetable forms, which in other regions do not belong to the trailing or climbing orders of plants. The most common instances are afforded by the leguminous jasmine, nettle, and similar families. There is even a twining palm-tree, the *Jacitara* of the Tupi natives. On the other hand, such trees as do not climb grow to an unusual height, and are everywhere entangled in the coils of huge snake-like lianas. Large trees and plants

of parasitic growth interlace their matted foliage in inextricable confusion, some twining together like cables composed of several strands, while others are twisted in a thousand ways round the stems, forming gigantic folds and meshes about the thick upper branches. Others again trail along zigzag fashion, or else shape themselves like the rungs of a ladder leading to the dizzy heights above. The flowers and the fruits of the great forest-growths are all to be sought in these upper regions of leafy domes, where the tree-tops enjoy the free air, the light and warmth of the tropical suns. All below is dark, mouldy, and cavernous, the dank soil and gloomy recesses unrelieved by bright flowers or even any green herbage.

It should here be noted that the continuous forest zone is not confined to the Amazonian depression, but extends also along the sea-board, especially about the fluvial estuaries and on the low-lying tracts between the escarpments of the plateau and the sea-shore. Here also the primeval woodlands formerly stretched with little interruption for hundreds of miles. They are similar in their main features to those of the great equatorial river valley, and contain trees of the same or allied genera, although the species are in many respects different. Such especially is the case with the palms, which relieve the more sombre masses of the woodlands in both regions, but, while presenting the same variety of size, stem, crown, and leaves, are represented by different species in the two zones. Where the land is more elevated and hilly, the trees are generally of less lofty growth and farther apart. All the tribe of plants with long, broad and glossy leaves peculiar to the swampy inland region are here absent; but in compensation flowers are much more profuse, an endless variety of

lovely ferns beautify the glades, and on the higher slopes the Brazilian pine (*Araucaria brasiliensis*) enters as a fresh element into the woodland scenery.

Originally this forest zone clothed nearly the whole surface of the Atlantic provinces from about 25° S. lat. to the Amazon estuary, the chief exception being the somewhat arid districts of Ceara and neighbourhood north of Pernambuco, where arboreal vegetation is more scanty. Nourished by the already described rich red loam, and stimulated by the high temperature and copious rainfall, this magnificent flora spread and flourished everywhere, developing, under the influence of the secular struggle for existence, the thousands of strange and beautiful forms that now delight the eyes of the observant traveller. But in the mountainous southern provinces extensive tracts of these glorious woodlands have been cleared for the plantations and the purposes of civilised man, and although some of these clearings may be afterwards again abandoned to nature, the second growth never attains the charm and luxuriance of the primeval forest. Such woods of second growth, locally called *caá-poeira*, that is, "felled timber," consist of multitudes of low trees and saplings matted together with thorny bushes and creepers. After some experience of these after-growths in the province of Rio de Janeiro, Prince Adalbert of Prussia thus speaks of the impression produced on the observer by the first sight of the true primeval woodlands:—

"At first we gazed in wonder on the labyrinth of tall straight trees rising like giants above the tangled creepers and climbers which surrounded us. We looked up to the light canopy of foliage, through which was seen the vault of heaven as through a veil; but we could not account to ourselves for all we beheld. Every object

here is colossal, everything seems to belong to a primeval world. We feel ourselves to be dwarfed by our surroundings, and to form part of some other world. Our astonishment is increased by the great difference between the vegetation of these forests and our own. Instead of the flowering shrubs and fruit-trees with which we are familiar, we here see gigantic growths, twice or thrice their size, in all the splendour of the bloom that clothes the whole crown of the tree with its colour.

"The chief glory of our day's ride were such trees with magnificent large lilac or white blossoms, all contrasting beautifully with the varied green tints of the surrounding foliage. After enjoying this splendid display of colours, we turned to the deep gloom which stood revealed between the forest giants along our path. The flame-coloured efflorescence of a Tillandsia, forming a bunch a foot long and resembling a huge pine-apple or strawberry, glanced like fire amid the dark foliage. Again, our attention was attracted by the lovely orchids climbing up the straight stems, or gracefully festooning the branches, which seldom shoot out from the trunk at a less height than 50 to 80 feet from the ground. Among the various plants which spring from the boughs or cling to the stems, are the mosses hanging down, not unlike horses' tails, from the spreading branches. Myriads of woody climbers thus suspended in the air are often several inches round or even as thick as a man's body, and covered with bark like the branches themselves. But it is impossible for any one to conceive the fantastic forms they assume, sometimes falling like straight poles to the ground and there taking root again, sometimes affecting the form of large hoops or rings ten to twenty feet in diameter, or else twisted and coiled together like so many cables."

Hydrography—The Amazon—Estuary—Lateral Channels and Islands

From the hydrographic standpoint Brazil belongs entirely to the Atlantic basin, to which all the running waters find their way through three great drainage areas—The Amazon-Tocantins in the north, the Parana-Uruguay in the south, and the eastern seaboard between Uruguay and the Amazon estuary, with a small tract extending beyond the same estuary to French Guiana. Of these areas by far the most extensive is the first, even if the Tocantins be detached from it as now forming an independent fluvial system. With its innumerable northern and southern affluents, some of which are themselves rivers almost of the first magnitude, this prodigious waterway drains the whole of the vast province of Amazonas, with a great part of Matto Grosso and Para, drawing its supplies from regions extending five degrees to the north and fifteen to the south of the equator, and flowing from Tabatinga, where it enters Brazilian territory, for 2400 miles eastwards to the Atlantic. Throughout the whole of this distance, the Amazon, whose upper or Andean section has already been described, resembles, wherever free from islands, rather a great arm of the sea than a fresh-water inland artery. Even above the Madeira confluence the permanent channel is here and there several miles wide, while lower down, as at Porto de Moz, above the delta, it expands to a width of 40 or 50 miles. The current, which has a normal easterly trend south of the equator, on which it converges at the delta, is generally placid and almost sluggish, although varying somewhat with the incline, and at a few points attaining a velocity of from 3 to 4 miles an hour.

But at Tabatinga, where it is 2 miles wide, the

Solimões, as it is called between this point and the Rio Negro confluence, has already reached the low level of 270 feet above the sea, so that the mean fall throughout its Brazilian course is scarcely perceptible. In fact it is estimated by Canstatt at not much more than one yard in 32 miles, except during the floods, when the fluvial channel is merged in the *Rio Mar* ("Sea River"), as it is then called by the Brazilians. As in the Nile valley, vast tracts are thus periodically covered with a rich sediment, the marks of which are in many places left on the stems of the trees to a height of 60 feet above low-water level. The rise, which begins in January and reaches its maximum in June, is mainly due to the regularly recurring tropical downpours, which greatly increase the volume, especially of the southern affluents, and cause them to become for a part of the year tributaries rather of a great inland sea than of a fluvial water-course. But the effect is certainly heightened by the great bore, or *pororoca*, as it is locally called, which at the syzygies, when sun and moon act in concert, rushes up the estuary like a huge ocean wave 16 feet high, stemming and driving back the main stream itself, and at certain spring-tides penetrating for hundreds of miles inland, occasionally even as far as the Purus confluence. At these times depths of 500 or 600 feet have been recorded by the soundings, which, however, are for the most part highly untrustworthy, due attention not having always been paid to the velocity of the current. Hence the results vary enormously, even for the same places and seasons, and according to some more careful recent surveys, the depth of the channel would appear nowhere to exceed 400 feet at any time.

As elsewhere pointed out, no true delta has been developed, and the great bulk of the water representing

the drainage of half a continent is discharged into the Atlantic mainly through a single channel at the equator. This channel, which is disposed in a number of secondary waterways by *Mexiana*, *Caviana*, and several other insular formations, sweeps round the north side of *Marajo* or *Juannes*, which although called an island is really a part of the mainland, from which it is separated towards the west only by a few narrow passages. On the south side Marajo is enclosed by another very broad estuary, the so-called *Rio Para*, which looks like a second branch of the Amazon, which would thus seem to bifurcate above Marajo and form a delta enveloping that island between its two arms. Such was, no doubt, formerly the case; but it is so no longer, and at present the main stream sends very little of its contents to the ocean through the Rio Para, with which, in fact, it is connected only by an intricate network of backwaters, narrow lateral passages and other shifting channels. No doubt some of these *furos*, as they are called, are navigable, but they are so narrow that there is scarcely room for two steamers to pass each other in them. Hence some are reserved for the up journey to the Amazon, others for the downward passage, and this rule of the road is carefully observed by the local pilots, so that collisions are rare. All these channels are merged in a continuous sheet of water during the floods, when the Para again assumes the aspect of a southern arm of the Amazon. But at other times it is now rather an independent estuary, through which the Tocantins and a few quite secondary coast-streams reach the Atlantic. When the Amazon extended several hundred miles farther seaward than at present, the Tocantins formed undoubtedly one of its great southern affluents, but is, under the altered conditions, large enough to be considered and treated as an independent

fluvial system discharging to the sea through the Para estuary.

Flowing entirely through level and densely wooded lowlands, the Brazilian section of the Amazon presents almost everywhere extremely flat banks stretching for interminable distances away from the channel of the Rio Mar. These tracts, forming a sort of debatable land between *terra firma* and the liquid domain, are scarcely accessible except by canoes or keelless boats, being intersected in all directions by stagnant backwaters, sluggish lateral channels or shallow lagoons, all of which are continually shifting their beds, enlarging or contracting their margins with every recurrent inundation. In some places the lateral *paranamerims* ("little rivers"), as they are locally called, extend for hundreds of miles generally parallel with the main stream. It is thus possible to ascend the valley of the Amazon in a canoe for vast distances, and even pass from tributary to tributary through the dense forests without ever entering the main river. But for regular navigation these byways are useless, owing to the fluctuations to which they are subject after the periodical floods.

Similar fluctuations extend to the great artery itself, where, however, it is not the liquid masses but the insular formations that are subject to incessant change. Such formations occur everywhere, but are everywhere of variable character—some mere shoals and banks flush with the surface and swept away by the next freshet; some permanent land rising well above the normal water-level, and for the most part densely wooded; others again dangerous floating masses, torn from the river banks and drifting with the stream. Many of the *caa-apoam*, as the true islands are called, in contradistinction to the *prayas* and *coraes*, that is, the evanescent sand-banks,

form familiar landmarks 5 or 6 miles long, generally encircled by a mangrove fringe, and clothed with the *montrichardia* and other plants of arborescent habit. Amongst the largest of these are the *Ilha de Paricatuba*, and the *Ilha de Tupinambaranas*, at the Madeira confluence, the latter so named from a warlike band of Tupis who, like many other kindred tribes, withdrew from the Portuguese invaders of the seaboard, and here took refuge about the year 1560. This large island, or rather riverine tract, is formed by the *Furo Uraria*, a narrow channel branching off from the right bank of the Lower Madeira and joining the main stream about 200 miles lower down.

The Amazonian Affluents

After entering Brazilian territory, the Amazon continues to be joined on both banks by numerous affluents, many of which equal or surpass the largest European rivers in length and volume. These affluents are classed by the natives in two categories—the "Blackwaters" and the "Whitewaters"—according to the apparent colour of their liquid contents. Streams flowing through alluvial tracts, where the loose friable soil is continually washed away, are "white" because of the usually light shade of their turbid water, while those confined in rocky beds are "black," although really much clearer than the others. The Amazon itself belongs, as might be expected, to the white class, which are said to be far less malarious than the black, and these in their turn more exempt from the mosquito plague. Of both there are altogether over 200, of which about 100 are navigable, while 18 are described as rivers of the first rank, and 6 longer and more copious than the Rhine. Within the Brazilian

frontier there are thus altogether 27,000 miles of navigable waters thus distributed:—

Main stream	2,300 miles
Tributaries on both banks	20,700 ,,
Lakes and Lagoons	4,000 ,,

Subjoined are some of the more important affluents on both banks, taken in the direction from west to east:—

	Length, miles.	Basin, sq. miles.	Mean Discharge, cub. ft. per second.	Navigable Course, miles.
Southern Affluents				
Javary	600	35,000	50,000	550
Jutahy	400	12,000	18,000	380
Jurua	1300	92,000	90,000	1000
Purus	2230	148,000	140,000	1560
Madeira	3000	495,000	570,000	1000
Tapajos	1200	165,000	184,000	870
Xingu	1300	150,000	140,000	620
Northern Affluents				
Iça (Putumayo)	1000	45,000	75,000	650
Japura	1700	120,000	178,000	930
Negro	900	275,000	385,000	480
Trombetas	350	47,000	54,000	320
Tocantins	1750	350,000	360,000	500
Amazon from Tabatinga to Estuary	2300	2,230,000	4,250,000	2300

The Jurua, Purus, and Madeira

Beyond the *Javary*, already referred to as the frontier river towards Peru, follow the *Jutahy*, the *Jurua*, the *Teffé*, and the *Purus*, all of which are strictly lowland streams lying almost entirely within Brazilian territory, and winding in somewhat sluggish channels in a parallel north-easterly direction across the bed of the old Amazonian sea. Hence all are free from rapids and

other obstructions, and as they lie well within the zone of heavy rains, are copious waterways navigable nearly to their sources. Although ranking in Brazil only as a third-rate river, the Jurua was ascended for over 1120 miles by Chandless to a point where it was still 30 feet deep and 400 feet wide. Still longer and more copious is the Purus, which is accessible to steamers for 800 miles, was actually ascended by Serafim 1300 miles in boats, and has a total length of 1850 miles. There are many head-streams, some, such as the *Aquiry*, *Pauyarim*, and *Tapana*, themselves large and navigable rivers ramifying widely over the wooded Amazonian plains, which superabound in all kinds of valuable forest products.

Beyond these tranquil and almost stagnant waterways follows the impetuous *Madeira*, largest of all the southern affluents, which is formed by the junction of the *Itenez* or *Guaporé*, with the Bolivian Mamoré above the Great Falls, as described in a previous chapter. The Guaporé, which for the Brazilians is the upper course of the Madeira, and in any case is much wider if not more copious than the Mamoré, almost intermingles its waters with those of the Paraguay at the low narrow divide between the two basins near the town of Matto Grosso. After collecting the surface drainage of the southern slopes of the Cordilheira Geral, it converges with the Mamoré in a single stream, here already half a mile wide, some distance above the junction of the Beni on the left bank. Before reaching this junction the Madeira already enters the rocky gorges of the projecting spurs of the Cordelheira through which it has to cut its way down to the Amazonian plains.

Thus is developed the long series of falls and rapids, which have a total length of over 200 miles, as appears from the plans of the railway which has been projected

to turn these insuperable obstructions to the navigation, and is 180 miles long, although avoiding some of the sharper fluvial windings. Throughout this section the stream is everywhere swift and dangerous, with many back currents, whirlpools, and swirling waters, even between the actual falls themselves. Between the *Great* and *Little Guajara* Falls above the Beni confluence, and the *Santo Antonio* rapids where the river escapes from its rocky fetters to the plains, as many as twenty of the more formidable barriers have been enumerated, some bearing such expressive names as *Misericordia* and *Calderão do Inferno, i.e.* the "Cauldron of Hell." Those specially known as the *Madeira Falls* are not the most imposing; but they stand just under 10° S. lat., where the river quits Bolivian territory and becomes entirely a Brazilian watercourse, and, according to some authorities, here properly takes the name of *Madeira,* that is, the "Driftwood River." It was so named in 1725 by its first explorer, Palheta, who noticed large quantities of snags and other driftwood floating down with the stream. The native name, current before that time, was *Cayari,* the "White River."

At the station of Santo Antonio, a little below the rapids of like name, where all navigation properly so called is arrested, the Madeira is a noble river about 1000 yards wide, and at this distance of some 1600 miles from the Para estuary, is accessible to ocean-going steamers for eight or nine months in the year. Even in the dry season from August to October, when there is a total fall of nearly if not quite 50 feet below the highest flood-waters, steamers and other craft drawing 3 or 4 feet ascend right up to the foot of the rapids, though care has to be taken at the *Tamandoa* sand-bank above the confluence of the *Rio Machado* on the right

side. At low water this sand-bank extends for many miles, and is frequented by prodigious numbers of turtles for the purpose of laying their eggs. "On one occasion, passing this bank in a canoe, I saw an extraordinary sight. For miles, as far as the eye could reach down the river, were continuous rows of turtle at the water's edge; the rows being eight or ten deep, many thousands must have been collected together."[1]

The Tapajos, Xingu, and Tocantins

Between the Madeira and the Tocantins the Amazon is joined by two other great tributaries—the *Tapajos* and the *Xingu*—both of which draw their farthest supplies from the northern slopes of the central divide between the Amazon and Paraguay basins, and, after a nearly parallel northerly course of many hundred miles through Matto Grosso and Para, reach the right bank of the main stream below the Obidos narrows. The crest of the divide where these Amazonian streams take their rise has a mean altitude of not more than 1600 or 1700 feet, although dominated here and there by a few isolated peaks from 2000 to 3000 feet high. Seen from the south, where it falls in steep escarpments abruptly down to the Paraguay basin, it presents the aspect of a long mountain range of moderate elevation. But its true character is rather that of a plateau with a somewhat gentle incline in the direction of the north, where it gradually merges in the Amazonian plains.

The true mountain range, still represented in a fragmentary way by the isolated peaks, has mostly disappeared by weathering and the erosion of the running waters, which have ravined the plateau itself, and has

[1] Mathews, *op. cit.* p. 21.

exposed the very old crystalline rocks—gneiss, porphyries, granites, and quartzites—which form the main constituent elements of the whole region. Thus the Tapajos, which is formed by the junction of the *Arinos*, *Juruena*, and several other head-streams, all rising on the northern slope of the Campos or Cordilheira dos Parexis, develops, like the Madeira, a long series of falls and rapids about its middle course, where it cuts its way down to the plains. Some of these cataracts, such as that *do Inferno*, bear even similar names, and are followed 300 miles farther on by the *Salto Augusto*, which arrests all navigation even at high water. Beyond these falls the Tapajos is accessible to large vessels for the rest of its course of over 200 miles through the Amazonian woodlands to its junction with the main stream near Santarem. Here is formed the large flooded depression of *Lake Villafranca* or *Campinas*, which communicates through several channels both with the Amazon and the right bank of the Tapajos.

Like the Tapajos,[1] the Xingu (Shingu)[1] is obstructed by numerous reefs and rapids, some of which are impassable even by canoes. It enters the main stream through a very broad, island-studded mouth, at the head of the Amazon estuary, with which its lower reaches are completely merged during the floods. The Xingu flows mostly through unsettled wooded districts, which are still held by fierce and hostile wild tribes; hence its basin was little known before the explorations of Von den Steinen in 1884-87.

Beyond the Xingu follows the now semi-independent basin of the *Tocantins*, which comprises nearly the whole of Goyaz, the western parts of Matto Grosso, and a

[1] In Portuguese x=*sh*, as in *shin*; j=y; hence *Tapajos*=*Tapayos*; *Xingu*=*Shingu*.

considerable section of East Para, with a drainage area of probably not less than 350,000 square miles. Its lower course is formed by the junction about 6° S. lat. of two great branches, themselves formed by numerous head-streams, some of which have their sources on the slopes of the Serra de Santa Martha, some fourteen degrees farther south, where they almost intermingle their waters with those of the Upper Parana and S. Francisco affluents. Of the two main upper branches the *Araguaya* from the west appears to be the more copious, as it certainly is the longer, although the name of the Tocantins is retained by the eastern branch because the Portuguese pioneers came first upon this great waterway. In colonial times all private exploration of the interior was prohibited under the severest penalties, and in the eighteenth century Tavares Lisbao narrowly escaped with his life for having descended the Tocantins all the way to Para. This eastern branch is formed by the junction of the *Paranatinga* and *Maranhão* head-streams, the former descending from the Paranau and Tabatinga ranges, the latter from the little *Lake Formosa* in the Perineos transverse ridge. Below the confluence the Tocantins skirts the eastern foot of the Cordilheira Grande in a northerly direction to its junction with the Araguaya from the Goyaz uplands. In this section of its course the Tocantins is obstructed by several rocky barriers caused by the projecting spurs of the Cordilheira, and even below the Araguaya confluence it has to surmount the *Cachoeira Grande* ("Great Falls"), which arrests all shipping within 130 miles of the estuary, so that, notwithstanding its vast extent and a discharge of about 360,000 cubic feet per second, this great fluvial system is almost useless for navigation. To this fact is largely due the backward state of the vast province

of Goyaz, which has no direct access to the sea, although the Araguaya branch, forming its boundary towards Matto Grosso and Para, is navigable for long stretches at least in its middle course. After receiving several copious streams on both its banks the Araguaya ramifies into two great arms, which again meet 250 miles lower down. Thus is formed the great island of *Bananal*, that is, the "Banana Grove," a rich alluvial tract about 8000 square miles in extent, rising well above the highest floods and enclosing the *Lagoa Grande*, a large sheet of water communicating with the eastern arm. Below Bananal the Araguaya is so beset by reefs and rapids, and even falls, that in this section of its course it is even less navigable than the Tocantins.

The Rio Negro and other Northern Affluents

From the north the Amazon also receives many contributions, especially in the Solimões section, where it is joined by the already described *Putumayo* (*Içá*), the *Japura* and the *Negro*, this last by far the greatest of all its affluents. The Japura (*Hyapura*), rising with many head-streams on the Colombian uplands, has at first a tumultuous course, rushing through deep rocky gorges and over a long series of rapids to the great falls, below the *Araracoara* reefs, where it is precipitated over a magnificent cascade fully 100 feet high. In its sluggish lower course it develops a labyrinthine system of creeks, lagoons, backwaters, and lateral channels, which communicate with the main stream at several points both above and below the true confluence opposite Teffé. During the floods the whole of this low-lying region, some 40,000 square miles in extent, resumes the aspect of the old Amazonian sea all the way to the Lower Negro

basin. Below the point where it is connected by the Cassiquiare with the Orinoco system the Negro is joined on its right bank by the *Uaupes* (*Ucayaris*), which descends through many falls and rapids from the Colombian highlands, and is by many geographers regarded as the true upper course of the Negro. Below the confluence, by which its volume is more than doubled, the Negro trends eastwards at first over numerous cataracts and other rocky barriers, and then with a more placid current to its junction with the *Rio Branco* ("White River") from the north. Here the contrast is very marked between the dark though limpid waters of the Negro and the lighter stream of the Branco descending from the argillaceous plains on the British Guiana frontier. For some distance below the confluence the two rivers flow side by side before mingling their waters, which enter the Amazon at Manaos through a broad channel like a great inland estuary.

The *Barra do Rio Negro*, as Manaos was formerly called, has reference to a sort of "bar" where the Negro is 100 feet deep at low water, and rises about 40 feet during the floods. But in its lower course it is much obstructed by shoals, so that steamers drawing only 4 feet have sometimes to stop running, though they are generally able to ascend 450 miles to Santa Izabel, near the last rapid below the Uaupes junction. In 1904 Dr. T. Koch surmounted forty rapids in his ascent of the Uaupes to its Cuduiary affluent, which was for the first time navigated for five days through a thickly peopled district.

Beyond the Rio Negro the Amazonian basin is greatly contracted by the Sierra Acarai and its eastern extensions, which form the divide towards the waters flowing through the Guianas north to the Atlantic. Hence

throughout the rest of its course to the estuary the Amazon is joined on its left bank only by relatively small affluents, which are in no way comparable with the Tapajos and the other great tributaries on the opposite side. Amongst the more important, if not the largest, is the *Trombetas*, which drains a considerable extent of the northern savannah, and reaches the main stream just above the Obidos narrows, where it is confined to a channel scarcely a mile wide, but with a depth of perhaps 250 feet and a velocity of over 4 miles an hour. A curious feature of these north-eastern affluents is their tendency to develop broad lakes or lagoons before reaching the main stream. These flooded depressions—*Saraca* on the Uruba; *Jamunda* above and *Surubiu* below the Trombetas and many others—appear to be formed not by the rivers themselves, but by the large quantities of the sedimentary matter deposited by the Amazon about their mouths, thus stemming the current and causing it to expand into shallow reservoirs along their lower course.

The S. Francisco and other Coast Streams

Of the numerous rivers which reach the Atlantic in independent channels between the Amazon estuary and Uruguay, incomparably the largest is the S. Francisco, which has its farthest sources near those of some of the Parana head-streams on the slopes of the Serra da Canastra in the south of Minas Geraes, over 2000 feet above sea-level. In its upper course it is a boisterous upland stream, descending through a succession of rapids, here called *escadinhas* ("steps"), down to its juction on the right with the *Rio das Velhas* from the Queluz heights near Itacolumi. Below this point, still 1760

feet above the sea, the S. Francisco at once becomes navigable for large craft, flowing for hundreds of miles in a broad deep channel through Minas Geraes to the confluence of the *Rio Grande*, largest of all its numerous affluents. Here is presented another of those instances of a double incline, which are of more frequent occurrence in South America than elsewhere. The *Rio Preto*, a chief branch of the Rio Grande, is joined in its upper valley by the *Rio Sapão* flowing from a lacustrine basin, which communicates on the opposite slope through another emissary—the *Rio do Somno*—with the right bank of the Tocantins above the Araguaya confluence. The Somno itself is a considerable stream 250 to 400 feet wide, and from 5 to 20 feet deep. "The water is beautifully clear and transparent, and the scenery of the banks is inexpressibly charming. In many places they rise up into lofty, many coloured cliffs of sandstone, topped with forest, and veiled with trailing, flowering vines. In other places the campos extends to ruddy banks and white sandy shores, in long slopes of green-sward. In the shadowed pools of water at the bends, the lovely banks are mirrored as in a looking-glass." [1] Thus is presented the phenomenon, of a continuous natural waterway between the S. Francisco and the Amazon basins, similar to the already described connections between the Amazon, the Orinoco, and the Paraguay.

But these connections occur in flat, low lying districts, which were formerly flooded by the Amazonian sea, whereas the waterway between the S. Francisco and the Tocantins traverses an upland tract where most maps show a continuous mountain range—the *Serra da Tabatinga* —completely separating the two basins. This range,

[1] Wells, vol. i. p. 193.

however, which also takes other fanciful names, has no existence, and Mr. Wells, who first made the through journey by water, tells us that the divide is nothing but "a wide sterile sandy plateau, thinly covered with small scrub and tufts of wiry grass. A traveller can traverse it in a canoe from Barra do Rio Grande, on the S. Francisco, to the mouth of the Rio Somno, on the Tocantins. This high plateau, known as the *Chapada de Mangabeira*, extends to 10° S. lat. where it joins a similar high flat plateau that forms a horse-shoe in its course, and constitutes the watershed of the rivers of north-east Brazil" (vol. ii. p. 361). On a properly constructed physical map the whole of this region would appear as an island enclosed eastwards by the Atlantic and landwards by the Amazon, the Tocantins, the Somno, Rio Grande, and Lower S. Francisco.

Beyond the Rio Grande confluence the S. Francisco bends round from north to north-east and east, here flowing between Bahia and Pernambuco, and farther on between Sergipe and Alagoas, to the Atlantic, which it enters through two branches, both obstructed by bars with not more than 9 or 10 feet at low water. But about 160 miles higher up the navigation of the S. Francisco itself is completely arrested by the tremendous *Paulo Affonso Falls*, the "Niagara of Brazil." Here the stream, after winding in a broad channel through quite an archipelago of islands, is suddenly contracted to a narrow bed scarcely 60 feet wide, and precipitated over a rocky ledge to a yawning chasm nearly 300 feet below. In the dry season, when the discharge is estimated at this point at 35,000 cubic feet per second, the current is broken by several projecting rocks, but is merged in a single body of water during the floods, when its volume rises to probably over 150,000 cubic feet per second.

Even below the great falls several other obstructions have to be overcome, so that the S. Francisco, which has a total length of 1800 miles with a drainage area of 252,000 square miles, is accessible to sea-going vessels only for 135 miles from its mouth. But between the Paulo Affonso Falls and the Rio das Velhas junction there is a clear navigable stretch of about 1000 miles, and nearly 4400 miles including the affluents, many of which can be ascended by light craft for some distance above their confluences.

North of the S. Francisco the seaboard is traversed by several coast-streams, of which the most important is the *Parahiba do Norte*, which rises with several head-streams on the northern slopes of the *Serra da Barborema*, and flows in a north-easterly direction for 930 miles between the States of Maranhão and Piauhy to the sea, which it enters through a large delta projecting considerably beyond the normal coast-line. Notwithstanding its great length and a catchment basin nearly 140,000 square miles in extent, the "Bad River," as its name is said to mean, is so shallow and beset by shoals and reefs as to be scarcely navigable for vessels drawing over 5 or 6 feet of water.

South of the S. Francisco the chief arteries are the *Pardo* and *Jequitinhonha*, which converge in a common delta a little north of Porto Seguro; the *Rio Doce*, which descends from the Serra das Vertentes, and after describing a great bend from north to east pierces the Serra dos Aimores on its course to the sea above Santa Cruz; the *Parahiba do Sul*, which rises on the inner slope of the Serra do Mar, and after flowing some distance to the south, as if to join the Upper Parana, trends round to the north-east, and maintains this direction for the rest of its course through the State of Rio de Janeiro to the

coast above Cape S. Thomé ; lastly, the *Rio Jacuhy*, which, after collecting the drainage of a great part of the State of Rio Grande do Sul, enters the *Lagoa dos Patos* at *Porto Alegre.*

This extensive coast lagoon appears to take its name not from the *patos* ("ducks") by which it is frequented, but from the now extinct *Patos Indians*, who formerly occupied its shores. It is by far the largest of the chain of similar marine formations which fringe the Atlantic seaboard all the way from Santa Catharina to Uruguay, and are due partly to the action of the waves and currents washing up the sands, and partly also perhaps to the upheaval of the outer coast-line thus created. Some of the lagoons are already completely closed, and their waters have become brackish or even fresh, while others still communicate with the sea through creeks or shifting channels often closed in the dry season. The Lagoa dos Patos, which has an area of between 3000 and 4000 square miles, sends its overflow to the Atlantic through the permanent outlet of the *Rio Grande*, just below the point where it receives the inflow of the *Lagoa Mirim* on the Uruguay frontier (see p. 419).

The Jaguarão frontier river, as well as the Upper Parana and Paraguay basins lying within Brazilian territory, have been described in previous chapters.

CHAPTER XV

BRAZIL—(*continued*)

Climate—Flora—Fauna—Inhabitants—The Aborigines—The Tapuya, Tupi-Guarani, Carib, and Arawak families—The Brazilian Negroes—The Europeans—Topography—Natural Resources—Mining Industry—Agricultural Prospects—Coffee Culture—Stock-Breeding—Forest Produce—Railway Enterprise—Trade—Government—Education—Finance—Armaments.

Climate

In the north Brazil extends at one or two points nearly five degrees beyond the equator, and in the south about ten beyond the Tropic of Capricorn. But here it contracts to very narrow limits, so that with the exception of the southern section of Parana, Rio Grande do Sul, and Santa Catharina, nearly the whole region is comprised within the south torrid zone. As there are, moreover, nowhere any alpine heights or snowy mountains, but only moderately elevated tablelands intersected by low ranges or ridges, the climate is on the whole essentially tropical, modified on the seaboard by marine influences and in parts of the interior by special local conditions. The modifications are, however, greater than might be supposed, as may be seen from the remarkable deflections of the isothermal lines on recent climatological charts.

Three zones have in fact been distinguished—a strictly tropical, comprising the states of Pernambuco, Parahiba, Rio Grande do Norte, Ceara, Piauhy, Maranhão, Para, Amazonas, and parts of Goyaz and Matto Grosso, say, 2,600,000 square miles; a warm or sub-tropical, including the northern section of Parana, Rio de Janeiro, Santa Catharina, Rio Grande do Sul, and the greater part of S. Paulo, with some of the high grounds in Minas Geraes, Goyaz, and Matto Grosso, altogether about 600,000 square miles; lastly, a temperate zone of perhaps 100,000 square miles in various parts of the southern States. But even here, as well as on the highest summits, snow and ice are rare and passing phenomena, although 30,000 head of cattle perished of cold in the Lages district of Rio Grande do Sul during the exceptionally severe winter of 1859. Mild frosts are most frequent on Itatiaya, and in the uplands of South Minas Geraes the glass stands for about a week at 6° or 7° Fahr. below freezing-point. The foregoing picture is supported by the subjoined returns of the mean annual temperature from various parts of Brazil for the year 1889-90:—

State.	Town or District.	Mean Temp.
Maranhão	Santa Luz	81° Fahr.
Para	Para	79° ,,
Ceara	Fortaleza	82° ,,
,,	Quixeramobim	85° ,,
Matto Grosso	Cuyaba	79° ,,
Piauhy	Amarante	80° ,,
Pernambuco	Recife	79° ,,
Espirito Santo	Colonia Izabel	74° ,,
,,	Victoria	77° ,,
,,	S. Bento das Lages	76° ,,
Bahia	Bahia	79° ,,
Minas Geraes	Queluz	68° ,,
,,	Ribeiro Preto	68° ,,
R. de Janeiro	Nova Friburgo	63° ,,

State.	Town or District.	Mean Temp.
R. de Janeiro . .	R. de Janeiro	74° Fahr.
,, . .	Santa Cruz	70° ,,
S. Paulo . . .	Casa Branca . . .	74° ,,
,, . .	Cascata	64° ,,
,, . .	S. Paulo	62° ,,
Parana . . .	Curitiba	64° ,,
Sta. Catharina . .	Blumenau	70° ,,
Parana . . .	S. Antonio da Palmeira .	64° ,,
R. Gr. do Sul . .	Nova Petropolis . . .	66° ,,
,, . .	Santa Cruz	66° ,,
,, . .	Passo Fundo	63° ,,
,, . .	Taquary	65° ,,
,, . .	R. Gr. do Sul	66° ,,

Even the highest of these records do not at first sight seem excessive, and in England, a pre-eminently temperate region, the thermometer occasionally registers 80° or more in the shade. But what is here exceptional is normal in most parts of Brazil, where it is the persistence of high temperatures throughout the year, and the absence of spring and autumn transitional periods, that make the heats so oppressive and exhausting. Little relief is obtained even at night, except on the Amazon, parts of the seaboard and the extreme south, where there is often a range of as much as 20° within the twenty-four hours and from season to season. The four seasons, however, are confined to the Almanac, and the people themselves recognise only a dry and a wet period, the latter lasting generally for two or three months—in the south from October to December, in Pernambuco from April to June, in Rio de Janeiro formerly from November to March, but since the disappearance of the forests at no fixed time. In the interior also, and especially in the Amazonian lands, it rains throughout the year, although even here the distinctly wet season is, as a rule, limited to the period from December to May. This great excess of moisture, which renders

the heats still more unbearable, is due to the Atlantic trade-winds, which prevail for a great part of the year, and are nowhere intercepted by great mountain barriers.

But, strange to say, what are chiefly dreaded, especially in Ceara and neighbouring lands, are not the rains but the droughts, such as that which lasted for four years at the close of the eighteenth century, and is not yet forgotten. All the live-stock perished, whole districts were depopulated, and the survivors were reduced to the verge of starvation. Such protracted droughts are always possible, and at such times the vegetation itself gets burnt up, the springs and streams cease to flow, and the parched soil gapes with great cracks and fissures.

On the other hand, the tropical downpours last at times for weeks together, and are accompanied by tremendous thunder-storms and hurricanes, as in 1817, when the ships broke from their moorings and hundreds of lives were lost at Rio de Janeiro. From the few systematic observations that have been taken the annual rainfall rises from 8 or 10 inches on some parts of the seaboard to 500 or 600 inches and even upwards in some parts of the Amazonian depression. On the coast, between Cape Orange and Rio Grande, the north-east winds prevail from September to March, when they are succeeded by the south-east trades for the rest of the year. But between Cape S. Roque and the Amazon estuary the marine breezes set steadily from the south-south-east throughout the year, though they are most felt from October to March. Like the pamperos from the south-west, they blow at times with great violence, often strewing the coast with wreckage, but also aiding the navigation of the interior, where sailing-vessels easily ascend the Amazon, driving before the wind right up to the Peruvian frontier.

All things considered, the southern provinces are the most suited for European settlement. The Minas Geraes uplands, about the head-waters of the S. Francisco, are also distinctly healthy, and all travellers in these districts hear of extraordinary cases of longevity. Mr. H. C. Dent, amongst others, was told that "there never was any illness, and the people are very long-lived, often attaining a hundred years of age. One old woman living near is a hundred and twenty, her husband died many years ago at nearly a hundred; I was shown some time later the portrait of an old negress who lives at Pitaguay, named Joanna, who is 127 years old and still does everything for herself."[1] South Goyaz, still farther inland, enjoys a similar reputation, and this is one reason why it has been proposed to remove the seat of government from Rio de Janeiro, in the yellow fever coast zone, to the Formosa district in that province. But yellow fever is largely a question of sanitation, and a crowded city like Rio might find itself equally exposed to the plague even on the breezy Goyaz uplands. Formerly the whole of the interior, and especially the plateaux, were supposed to be safe from its attacks. But this delusion was dispelled by its appearance at Manaos in 1856, and by several outbreaks since 1890 at Cantagallo, Campinas, and other inland towns. Its range, however, is said to be limited vertically to about 2500 feet, no known cases having yet occurred on the slopes above that altitude.

Other fevers are endemic in many parts of the interior, and several varieties of ague are prevalent along the periodically flooded level banks of the S. Francisco below the Velhas confluence. But compared with the whole region, these fever-stricken districts are of quite

[1] *A Year in Brazil*, pp. 57, 58.

limited extent, although to them Brazil mainly owes its undeserved reputation of being an insalubrious land. Even the Amazon, flowing almost on the equator, is classed as a "white river," and is in any case somewhat immune from malaria, being in this respect almost comparable to some of the healthy woodlands of the Bolivian yungas. It is noteworthy that wherever the surface is disturbed by railway cuttings and similar works, the operations are usually followed by an outburst of some form of malarious fever. Such was the case when the City Improvements Company took Rio in hand in 1863-68.

But the hope that the drainage works then carried out would put an end to the constant visitations of yellow fever were doomed to disappointment. Rio still remains, next to Santos, the chief hot-bed of the pest along the whole seaboard. It attacks foreigners, such as ships' crews and immigrants, by preference, and Italians were the chief victims during the epidemics of 1891-92. It rages especially in December and January, and generally subsides with the first appearance of cold in May or June, hence is essentially a tropical disease, like African fever, but of a different character; Brazilian negroes, proof against yellow fever, are as subject as Europeans to the African varieties, and Sudanese negroes are as liable as the white immigrants to the attacks of the American "yellow jack."

Next to this disorder the most prevalent is perhaps rheumatism, which is said to be in Brazil, as in so many other countries, on the increase. Scrofula and other skin diseases are widespread, but would appear to be mainly confined to the negro and mulatto classes, amongst whom they often assume some very repulsive forms. The *puru-puru* variety, however, is peculiar to

the Amazonian aborigines, amongst whom small-pox also at times makes frightful ravages.

Flora

Despite much diversity of form, due to the varying conditions of soil, climate, and altitude, the exuberant Brazilian vegetable world presents almost everywhere a certain uniform south tropical aspect. So vast, however, is this botanical field that, even after the protracted researches af Humboldt, Bonpland, De Candolle, Martius, Waterton, Spruce, Bates, Wallace, and other eminent naturalists, the systematic study of the Brazilian flora is still far from exhausted. Extensive districts teeming with plant life have never yet been visited, and although as many as 22,000 endemic species have already been described, no one can say how much there still remains to be discovered. In this boundless botanical zone the striking features are the primeval woodlands, which still cover the Amazonian plains and large tracts of the seaboard, and the general aspect of which has already been described. A marked peculiarity is the strange absence of conifers, the chief exception being the *Araucaria brasiliensis*, and even this is mainly confined to the slopes of the serras between 18° and 30° S. lat. It is one of the few plants which, like the wax-palm and maté, are of sociable habits, forming, especially in the east, extensive thickets of uniform and exclusive character.

Elsewhere the woodlands are peopled by an endless diversity of forms, none of which in the struggle for existence is able to acquire a marked predominance over its rivals; hence the prodigious variety of species which distinguishes this botanical zone beyond all others. Thus is presented the most violent contrast between the

rich arboreal and parasitic vegetation of the marshy Amazonian lowlands, and the above described monotonous, grassy, and scrubby growths of the somewhat arid campos region. But it has been calculated that the wooded lowlands comprise only about one-third, and the far less productive campos districts of the central uplands half as much again of the whole land, and it is this consideration that has to be borne in mind when reading the current glowing accounts of the "unlimited resources of the Brazilian republic." Under the term "campos," however, are comprised many tracts which differ considerably in their main features, and are locally known by distinctive names, which, being little understood elsewhere, have tended to create the confused and erroneous impressions still prevalent regarding the true character of the greater part of this region. Hence some of those in more general use are here subjoined and defined:—

Campos geraës, "general campos," the interminable level or slightly rolling tracts under short coarse herbage, where the monotonous landscape is seldom relieved by any conspicuous object.

Campos abertos
Campos cerrados } described at p. 502.

Campos veros, "true campos," grassy, treeless and waterless plateaux.

Campos agrestes, "rough campos," where coarse tufty herbage of grayish colour prevails.

Campos mimosos, "tender campos," under soft, fresh, bright green pasturage, suitable for cattle-runs.

Taboleiras, "platters," very flat and dry herbaceous plains.

Chapadas, "high ground," applied vaguely to elevated plateaux, low ridges or serras traversing the campos.

Sertões, "backwoods," a term of universal use, not everywhere suggestive of woodlands, but rather of waste lands of any kind—a wilderness; applied in a general way both to the taboleiras and the chapadas. The wide use of this word points at the really barren or unproductive character of a great part of the central uplands.

Capoës, "thickets," patches of low growth, especially palms, in the more humid parts of the grassy campos, lending variety and charm to the landscape.

Carrascos, "scrub," brushwood.

Serradões, "high woods," stunted wooded tracts on the dry, unproductive uplands.

Charneca, "heath," applied to scrubby open tracts forming a transition from the carrascos to the sertoẽs.

Catingas } extensive open woodlands of small growth and with much
Mato claro } underwood, affording cover to all kinds of animals.

Capoeira, "after-growths," the jungle that springs up with surprising rapidity in the abandoned clearings of the primeval forest, where are always found some species different from those uprooted.

In the virgin forests as many as 120 species have already been discovered, which are of distinct economic value — alimentary, medicinal, rubber-yielding, useful for building, cabinet-work, weaving, netting, plaiting, and other practical purposes. In this respect no land can compare with Brazil, just as no other tree in the whole world can compare with the Brazilian wax-palm (*Copernicia cerifera*), the *carnahuba* of the natives. This marvellous tree, which has a wide range in the north-eastern States, seems to concentrate in itself half of the properties of the vegetable kingdom. "It resists intense droughts, and is always green and vigorous. Its roots produce the same medicinal effects as sarsaparilla; its stem affords strong, light fibres, which acquire a beautiful lustre, and serves also for joists and other building materials. From parts of the tree wine and vinegar are made; it yields also a saccharine substance, as well as a starch resembling sago. Its fruit is used for feeding cattle; the pulp has an agreeable taste, and the nut is sometimes used as a substitute for coffee. Of the wood of the stem musical instruments, water-tubes, and pumps are made; the pith is an excellent substitute for cork; from the stem a white liquid similar to the milk of the coconut, and a flour resembling maizena may be extracted. Of the straw, hats, baskets, brooms, and mats are made; salt is extracted from it, and an alkali used in the manu-

facture of soap; but the most valuable product is the wax obtained from its leaves."[1]

Amongst the highly oleaginous plants growing wild are the coconut palm; *Attalea compta*, whose oil surpasses that of the olive; *Cocos gommosa*; *Cocos coronata*; *Copahiba*; *Ricinus communis*; *Sapucainha*, yielding a highly-prized odoriferous oil; *Carapa guianensis*, whose oleaginous seeds are the *Andiroba* of commerce. Even more important is the gummiferous and resinous family, including the *Seringeira* (*Siphonia elastica*), foremost of the rubber-yielding plants; the *Manga beira* (*Hancornia speciosa*); *Agoniada* (*Plumeria lancifolia*) and *Jatoba* (*Hymenæa courbaril*), from which is extracted copal varnish. Chief of the dyewoods are the *Pau Brazil* (*Cæsalpinia echinata*), of historic interest (see p. 52); dragon's blood (*Croton erythrina*); *Carajuru* (*Bignonia chica*); *Anil* (*Indigofera* and *Cissus Tinctoria*); *tagatiba* (*Maclura affinis*); red mangrove (*Rhizophora mangle*); various kinds of indigo and urucu (*Bixa orellana*), and *Genipa americana*, from the berries of which the natives obtain the blue-black dye used in tattooing. Highly fragrant aromatic essences are extracted from many plants, such as *Baunilha* (*Vanilla*), which was found by Von den Steinen to range far into Matto Grosso about the headwaters of the Xingu. The hundreds of indigenous, medicinal, aromatic, and alimentary plants, such as sarsaparilla, ipecacuanha, sapucaya, Brazil or Para nuts, guava, passion-flower fruit, cashu, cassava, maiz, tobacco, cacao, have been increased by cinnamon from Ceylon, nutmeg and other spices from the Moluccas, pepper from Jamacia, and bananas from Africa. Of this valuable plant there are in Brazil two species, *Musa paradisiaca* and *Musa sapientium*, the latter still often called S.

[1] T. L. Thompson, *The Forum*, March 1898.

Thomé banana, because introduced from that West African island in the sixteenth century. But of all such immigrants the most valuable are the sugar-cane and the coffee shrub, which have here found congenial homes, and are now amongst the chief sources of the national wealth.

A curiosity of the Brazilian flora is the tree-lily (*Vellozia*), locally called *Canella d'Ema*. It flourishes in the Campos geraës of Piauhy and Goyaz, and is noted for the lovely "mauve-coloured flowers at the end of each branch. In form the plant resembles a candelabra, but in composition no production of the vegetable world. The branches and stem consist, as it were, of a number of deep cups placed one within the other, strung upon a hard and tough pithy stem that runs through the centre" (Wells, vol. ii. p. 123). There are several known species, usually 4-5 feet high, and one in the Sapão valley about double that size.

Fauna

As already remarked, many of the Brazilian animals have acquired, or else further developed, climbing habits. This is specially true of the apes, who belong exclusively to the platyrhine (broad-nose) family, and are endowed with prehensile tails, a feature by which the American monkeys are strikingly distinguished from those of the Old World. But prehensile extremities are also possessed by many other denizens of the woodlands,—rats, mice, porcupines, sloths, frogs, lizards, and even some of the larger carnivora, besides many of the bird tribe. In this class the parrot family is as largely represented as is that of the apes amongst the mammals, whence the expressions "parrot land" and "ape land" concurrently

applied to the whole region. But perhaps with more justice it might be called the "insect land," for nowhere else is there found such an infinite variety of these low organisms, ranging from the largest and most resplendent butterflies and beetles down to the tiniest and most

YELLOW-TAILED HOWLER AND YOUNG.

ferocious ants, jiggers, mosquitoes, ticks, *carrapatos* and other equally pestilent *bichos*. In Brazil all noxious creatures, every dreaded or despised thing, or whatever no other name can be found for at the moment, are "bichos," properly grubs, but in general all kinds of pests and vermin, big and little, for which this region,

for reasons already explained, can hold its own against the world.

Three zoological zones have been distinguished,—the wooded eastern coast-lands, the central campos, and Amazonia. Here the main stream itself forms a sort of parting-line between the southern forms, ranging from its right bank nearly to the Plate estuary, and the northern, amongst which Central American types are numerous if not dominant. But the huge beasts so widely diffused in Tertiary times have disappeared, and in Brazil, as in other parts of the New World, no mammals have survived larger than the jaguar, puma, peccary, tapir, capybara, the aquatic manatee and the howling ape.

Of apes large and small there are over fifty species, all except ten confined to the northern zone. The howlers, most characteristic of all, are of sociable habits, and would seem to have developed a kind of tribal organisation under a chief howler. It is his office to lead the concert of dismal music, which is unlike that of any other animal, and is heard miles away about dawn and sunset. The group seldom leaves the tree where it has taken up its abode, holding on by their tails even when drinking. The *barbados*, "bearded," as the Brazilians call them, are the least tameable of all beasts, and even the Indians, who contrive to make pets or companions of most animals, never succeed in striking up a fellowship with a howler. Less known, although larger than this tribe, is the *buriquim* (*Ateles arachnoides*), of which there are four varieties ranging as far south as S. Paulo, and one, the *miriki*, is quite 3 feet high. But for sagacity and cunning the *coati* of Amazonia has no rival, and may also easily be domesticated. The natives, however, prefer the *barriguda* or woolly ape (*Lagothrix*), whom they call the *maleque*, or "little black,"

and whose air of comical gravity, combined with his strikingly human features, is highly amusing. Very attractive are also the Capuchine monkeys (*Cebus monachus*), and the pretty little marmosets, who form a

MARMOSETS.

sort of link between the monkey and the squirrel, and of whom as many as fourteen species have been described.

Even more numerous is the tribe of bats and vampires, comprising twenty-four known species, the largest of which, the true vampire (*Phyllostoma Spectrum*), is 6 inches long and 2 feet from tip to tip of its leathern wings. In Ceara and some other districts these blood-thirsty creatures commit serious ravages amongst the

cattle, and they swarm to such an extent in the caves of Minas Geraes and the Sapão valley, that, to believe the natives, "it is there impossible for any animal to live through the night" (Wells, vol. ii. p. 116). On the other hand, the Carnivora are not so numerous as might be supposed from the apparently splendid cover afforded by the boundless woodlands. But here most of their natural prey have taken to the trees, while the dark and gloomy recesses of the forests are not the most suitable environment for large animal life (see p. 21). The largest are the jaguar, here everywhere called an ounce (*Felis onza*), and the *kuguar* or puma (*Felis concolor*), both members of the cat family, of which there are altogether six species, distinguished chiefly by their size, the colour and markings of their coats. Thus there are the "spotted ounce," and the "black ounce," and some of these felines are said to be as large as an ox of moderate size. The domestic cat is noted for its long legs and ears, as in Greece.

The canine group, as mostly in the New World, is poorly represented in Brazil, which has little to show except the *lobo* (*Canis jubatus*), the Brazilian dog (*C. brasiliensis*), and a fox-like animal (*C. vetulus*) met only in the Campos. All have in common a great dread of man, and even the lobo (literally "wolf") never ventures to infest human habitations. On the coast-lands, and especially about the river mouths, is often seen the South American raccoon (*Procyon cancrivorus*), which is about the size of a setter, and has the curious habit of dipping its food in water before eating it. More widely diffused is the *coati*, of which there are two species, *Nasua socialis*, living together in large communities, and *N. solitaria*, found only in couples. Still more numerous are the marsupial opossums, of which there are two

chief groups (*Didelphys* and *Chironectes*), with as many as twelve species, varying from the size of a small mouse to that of a large cat, and generally with long noses and ears, and prehensile tails.

In Brazil the rodents are well represented; of the porcupine family alone there are six varieties, all climbers with prehensile tails, while the equally numerous cavies (*Cavia paca*) are of almost amphibious habits. They are excellent swimmers, and much hunted, their flesh being esteemed a great delicacy. It would be difficult to

COATI.

imagine a more lively scene than a paca hunt, in which old and young take part, some with their dogs ashore, others afloat in canoes armed with long bamboos used as fishing-rods. "A splash in front of us,—a paca has just taken a header into the river,—another and another and another; now several dark spots appear above the water, more and yet more, the stream is alive with swimming pacas. Now the long bamboos come into play; one is seized like a fishing-rod, and the hook at the end is adroitly hooked into the neck of the nearest paca, and drawn towards the canoe. More pacas slip or run down

the bank, driven by the yelping dogs. Standing up in the canoe, out of five shots I bag two of the animals. The others scatter in various directions, chiefly down stream towards the opposite shore" (Wells, vol. i. p. 191).

Of the *edentates* there are three families—the sloth with two genera (*Bradypus tridactylus* and *Br. torquatus*); the armadillo with six species, one as large as a half-grown hog; and the ant-eater, with two genera, one very

THE PACA.

large (*Myrmecophaga jubata*), frequenting the campos, the other much smaller (*M. tetradactyla*), a denizen of the woodlands. But for these armadillos and ant-eaters, who help to keep down the teeming insect life of the land, Brazil would be scarcely inhabitable by man.

Four species of the deer tribe, all called *Guazu* ("Great"), have been described—*Guazu pucu* (*Cervus paludosus*), whose home is about the streams of the marshy woodlands; *Guazu-y* (*C. campestris*), confined to the

Campos; *Guazu-pita* (*C. rufus*), the Brazilian roe; and *Guazu-bira* (*C. simplicicornis*). The first alone bears large antlers, and the flesh of none is esteemed by the natives.

Besides the tapir, largest of all Brazilian mammals,

THE GREAT ANT-EATER.

the Pachydermata are represented by two species of the peccary—*Dicotyles labiatus* or white-lipped, and *D. torquatus* or collared peccary. The former associates in droves of from forty to sixty, is very fierce, and will not

hesitate to attack the hunter, nearly always with fatal results unless he can take refuge in time in the branches of a tree. The flesh of both is prized, although the gland in the middle of the back secretes a musky substance which taints the meat if not speedily removed after capture. The tapir ranges in America from the United States to Patagonia, and was formerly widespread over both hemispheres, but now survives elsewhere only in Sumatra. In the Amazon are met two kinds of aquatic mammals—the lamantin or manatee (*Vacca marina*), often 9 or 10 feet long, and the *boto* or *bonto*, a fresh-water dolphin (*Delphinus amazonicus*), about 6 feet long. Both are hunted, like the whale, with harpoons, the former for its flesh, which is said to taste like pork, and also for its blubber, from which as much as 25 gallons of train-oil may be obtained.

Ornithologists have already enumerated nearly 1700 species of Brazilian birds, many of which are noted for their lovely forms and gorgeous iridescent plumage. In these respects nothing in nature can surpass the beautiful little humming-birds, which flash like sunbeams in the woods, in the campos, and in private gardens. Of the 390 species already described probably about 200 are found in Brazil, and amongst these are the *Lophornis ornata* and the *Chrysolampis moschitus*, perhaps the loveliest members of the whole family. Another species, the *Macroglossum*, bears such an extraordinary resemblance to the moth of like name, that even educated whites firmly believe that one is transformed into the other.

The toucan tribe has also numerous representatives, all noted for the apparently disproportionate size of their beaks, the explanation of which is given by Bates: "Flowers and fruits on the crowns of the large trees of

South American forests grow principally towards the end of slender twigs, which will not bear any considerable weight," so that the length of its beak enables the toucan to "reach and devour immense quantities of fruit while seated, and thus its heavy body and gluttonous appetite form no obstacles to the prosperity of the species."[1] Many of the Brazilian birds are endowed with soft melodious notes, and these are classed as warblers (*Canoræ*), of which Burmeister reckons 133 species. The same naturalist enumerates 185 croakers and 82 screamers, the noisiest of all being the parrots, which fly about in large flocks like our crows, are never at rest, and on the least pretext raise a concert of the most ear-splitting shrieks.

It is remarkable that there are no birds of passage, although some groups seem now and then to migrate from east to west, or from west to east, apparently in quest of food. Carrion and other carnivorous birds are represented by 23 species of falcons, 8 of owls, and 3 or 4 of vultures, including the king vulture, and the thievish *Urubu* (*Cathartes brasiliensis*). Of the latter Bates writes that they are always loafing about and watching their opportunity, and the instant the kitchen is left unguarded "the bold marauders march in and lift the lids of the saucepans with their beaks to rob them of their contents" (vol. i. p. 296).

As in the Orinoco, the sand-banks of the Amazon and its tributaries are frequented by myriads of turtles, some over 3 feet long and proportionately wide. They yield vast quantities of excellent food, while from their eggs is prepared a "butter," which is highly esteemed. Unfortunately they are preyed upon by so many enemies that their numbers are sensibly diminishing, and the

[1] *The Naturalist on the River Amazon*, vol. i. p. 344.

Indian saying that "there are more turtles in the Amazon than mosquitoes in the air" no longer holds good. Of the eight species of *yacaré* (alligator) the largest is the *yacaré-guazu* (*Caiman niger*), which sometimes measures 26 or 27 feet in length, and abounds especially in the Para waters. Not more than a dozen of the 48 or 50 species of snakes are really dangerous. One of the largest is the boa constrictor, which attains a length of 30 or 32 feet, but is not poisonous. It frequents the recesses of the rocks in dry, sunny districts, and is much less dreaded than the water boa (*Boa aquatica*), which grows to a larger size and is even said to swallow horses and oxen.

Amongst the venomous species are the ubiquitous rattle-snake, confined, however, in Brazil to the open Campos districts, and the even more dreaded and widespread *Jararaca* (*Bothrops leucurus*). Still more numerous are the batrachians—toads and frogs in endless variety, of all sizes and colours, swarming on land and water, in the marshy depressions, and on the highest trees. Some of the latter have a metallic note like the hammering of half a dozen blacksmiths, while the croaking of others is an almost infallible warning of rain.

The teeming insect life, to which reference was above made, is almost rivalled by that of the marine and fresh waters. In the Amazon basin alone there are over 1800 distinct species, chiefly of the families of the *Siluridæ*, *Salmonidæ*, and *Labridæ*. One of the most widespread is the ferocious *piranha*, of which there are several varieties, varying from 4 to 14 inches in length. It is the same as the Caribe of the Orinoco (see p. 98), only if possible more voracious and destructive, readily attacking boas and alligators, and reducing horses or oxen to a skeleton in a few minutes.

Strange to say, many of the Brazilian fishes, unlike the birds, are migratory, multitudes passing in a certain established order to the flooded tracts in the rainy season, and returning in spring to their accustomed haunts in the rivers. On these occasions myriads fall an easy prey to the herons, cormorants, gulls, falcons, and alligators that gather for the feast on the banks of the streams, without, however, perceptibly diminishing their numbers. Many, such as the huge *pirarucu* (*Sudis gigas*), the *pirarara*, the *sorumbin*, the *pirinambu*, and the piranha itself, are edible, and one of the most interesting sights in the large towns is the fish-market, every visit to which reveals some fresh member of the finny tribe.

Inhabitants—The Aborigines

It was above seen that the present peoples of Brazil represent three original stocks—the American, the Negro, and the Caucasic—some still preserving their racial purity, but the great majority merged in the general population, which must on the whole be regarded as the least homogeneous in Latin America. In general the aborigines, of whom over 160 "nations" were enumerated at the time of the discovery, have withdrawn inland and up-stream from the seaboard, where they now survive chiefly as one of the constituent elements of the settled and civilised inhabitants. The descendants of those who escaped destruction in the early wars, or absorption by the first settlers, now form two distinct social groups—the *Indios bravos*, that is, the still independent wild tribes, and the *Indios mansos*, that is, the "tame," or reduced and more or less civilised natives, who live in fixed settlements (the military colonies and the aldeamentos or village communities in the neighbourhood of

the settled parts), profess the Roman Catholic religion, speak the lingoa geral, and perhaps a little Portuguese here and there, and begin to regard themselves as Brazilian citizens.

Jointly the two groups may be estimated at about 800,000, and of these some 300,000 may be classed as bravos. They still occupy nearly one-half of the whole land, but are concentrated chiefly along the Amazonian river-banks, and about the sources of the great affluents. Although no longer raided or otherwise molested by the whites, they are everywhere melting away, victims of small-pox and other epidemics, and of "fire-water," as well as of the changed economic conditions. Their hunting and fishing preserves are continually encroached upon, while those who had reached the agricultural state are crowded out of their cultivated lands, and thus lapse again into the condition of mere savages, for whom there is no hope since the cessation of the former processes of assimilation by alliances between the two races.

Nor do the mansos fare very well at the hands of the military and other officials, who are supposed to continue the civilising work of the Jesuits in the former missions. They no longer receive such useful instruction as they are capable of understanding; no attempt is made to control or guide them, to restrain their vicious tendencies and especially their passion for ardent spirits, or to encourage those industrious habits for which many of the old communities were distinguished. The administrators of the aldeamentos usually consist of a director, a missionary, and an intrepreter, supported by a small armed force of negroes or mulattoes in uniform. But the director is mostly an "absentee," who rarely applies the Government subsidies to the moral and general education of the Indians in the way intended by

the authorities. In fact, little is done for their benefit, except by some of the padres who, faithful to their trust, endeavour to continue the on the whole beneficent work of the Jesuits.

The Tapuya, Tupi-Guarani, Carib, and Arawak Families

Some fresh light has been thrown on the ethnical relations of the Brazilian aborigines by the researches of Von den Steinen, Ehrenreich, Coudreau, and others about the head-waters of the Amazonian affluents. After the failures of D'Orbigny, Spix, and Martius and other eminent anthropologists, all further attempts to group them according to their physical characters must be abandoned, at least for the present. But, from the materials collected, especially by the Von den Steinen expedition in the central parts about the sources of the Xingu and other large rivers, ethnologists have been able to establish four great linguistic families—Tapuya, Tupi-Guarani, Carib, and Arawak—which, at least to some extent, correspond with the physical differences.

KAYAPO.

The Tapuya domain, which orginally extended from

the seaboard inland to and beyond the Tocantins basin, comprises two sub-groups—the *Ges* in the west, including the *Karayas*, *Kayapos*, and *Suyas* of the rivers Xingu and Araguaya, and the *Aimores* (*Botocudos*) and others now mainly confined to the coast ranges. At the discovery the innumerable Tupi tribes were in possession of the coast-lands between the Amazon and Plate estuaries, from which they have since mostly withdrawn, some up the Amazon as far as the Peruvian frontier, others to the central plateaux already held by tribes of the kindred Guarani stock. Hence, besides those elsewhere described in Argentina, Uruguay, and Paraguay, others are also met about the upper courses of the Xingu, Tapajos, Madeira, and as far west as the Marañon. Such are the *Cocomas* and *Omaguas* of the Purus and Marañon; the *Guarayos* of the Upper Guaporé; the *Mundrucus* of the Middle Amazon, the *Apiacas* of the Paranatinga; the *Yurunas* and *Manitsauas* of the Xingu, and many others.

APIACA.

The Caribs, hitherto supposed to be confined to Venezuela, Guiana, and the Antilles, have now been met in the very heart of the Continent, where they are represented by the *Bakaïri* and *Nahuquas* of the Upper

Xingu. As the Carib speech of these groups is of archaic type, and their culture also extremely rude and primitive, the inference seems reasonable that here is to be sought the Carib cradle-land, as is moreover indicated by the traditions of the tribes themselves. The first migratory movements would therefore appear to have been from Central Brazil to Guiana and the Antilles, and not, as hitherto generally assumed, from the Antilles southwards.

BAKAIRI.

On the other hand, the Arawak race would now seem to have originated in the north, and to have spread thence over the Orinoco and Amazon basins. Besides the well-known northern groups — Maypures, Atorais, Wapisianas, and others — many kindred tribes have now been met far to the south and west. Such are the *Piros* of the Ucayali, the *Miranhas* of the Jurua, the *Canamaris* of the Purus, the *Manaos* of the Rio Negro, the *Custenaús*, *Vaurás*, *Mehinakus*, and *Yaualapiti* of the Xingu, and the *Guanas* on the left bank of the Upper Paraguay.

Amid much uniformity and even sameness, two somewhat marked physical types can still be distinguished in these multifarious ethnical groups. While some have short thick-set figures, broad and rather flat features,

retreating forehead, prominent cheek-bones, slightly oblique eyes, small nose, depressed at the root, and light yellowish-brown complexion, others are noted for their tall, slim, and sometimes heavy forms, straight eyes set in well-rounded and high-arched sockets, large, straight or even aquiline nose, more regular oval features, reddish-brown colour, brighter and more animated expression. The former present at times a startling resemblance to the Asiatic Mongol, the latter to the Caucasic European, and thus the two types of primitive man, the long and round-headed revealed by the fossil skulls of Minas Geraes and Argentina, would seem to be still represented in the present aboriginal populations of Brazil.

NAHUQUA.

But during the countless ages that they have been thrown together in an isolated and relatively narrow region of the globe, there have been overlappings and interminglings, resulting in a general uniformity both of the physical and mental characters, as reflected especially in the long, black, lank hair, and the polysynthetic speech, which are the common inheritance of all alike. Although no large political states had anywhere been developed, so that we cannot speak in Brazil as on the Andean plateau, of great nations, but only of tribes, clans, and even family

groups, there have nevertheless been widespread movements, friendly associations or hostile clashings, invasions and conquests, as shown by the great predominance of some linguistic families over others. Thus the Guarani-Tupi stock language, which probably orginated about the Middle Parana and Upper Uruguay basins, had already reached the seaboard and was elsewhere widely diffused long before the arrival of the whites, and consequently long before the idiom was selected by the Jesuits as the general medium of intercourse in all the missions. They took the instrument best suited for their purpose, and that such an instrument was available is of itself sufficient proof that there had been in remote times shiftings and interchanges of speech between tribes of different origin, and it is this fact that, as above seen, makes it so difficult or impossible any longer to classify the Brazilian aborigines on other than a linguistic basis.

To migratory movements and interminglings may also partly be due the similarity in the usages of so many of the wild tribes, although common practices, social habits and even religious ideas are often best explained by the common nature of the physical surroundings. Most of them have ceased to be nomads in the strict sense of the term, and although still mainly hunters and fishers, they now also cultivate a little land in the forest glades. They generally go naked, and build round huts of palm foliage, which, however, contain few household utensils besides the hammocks often neatly arranged round the sides.

In the camping-grounds are generally seen some of the native animals, whom they show great skill in taming, but never any of the European domestic animals, except the horse amongst some of the steppe tribes, although to the indigenous crops, such as manioc and maize, they have added beans, bananas, ground nuts and a few other

exotics. All have a knowledge of fire, produced by friction and used solely for cooking purposes. It is noteworthy that all the boiling is done by the women, and the roasting and braizing by the men, the explanation probably being that the former process was a female invention, suggested by the forms of the gourds, afterwards imitated in clay, whereas roasting resulted from the experience acquired when hunting. In the embers of the fires kindled to scare wild beasts are often found the remains of small animals, fruits and roots "done to a turn." But the men alone join in the chase, and to them alone would thus be reserved the privilege of preparing the produce of the hunt in a similar way.

Although living on the banks of navigable waters, some of the tribes have never invented even a raft, while others make excellent bark canoes and dug-outs, used both for fishing and piracy, and in recent times also for trading purposes. The weapons are almost everywhere the same—bow and arrow, a formidable club of black palm-wood, a red-wood battle-axe, spears or darts and blow-pipes. The last mentioned, also of palm-wood, are usually nine or ten feet long, with little ten or twelve inch darts, tipped like the arrows in the potent *curari* poison, not however universally, but only amongst some of the Amazonian tribes. The effect of this virus on the human system is most remarkable, and can be explained only on the assumption that it attacks, not the sensory but the motor nerves, the consequence being that, while the patient still feels, he is powerless to make any response to outward stimulus. But death soon ensues, apparently from paralysis of the respiratory organs. There is also a kind of sling with which stones and hard clay balls are hurled from a little net, and turtles are taken with barbed darts or harpoons.

All delight in personal ornaments or what they regard as such. The chief adornments are feather-work, coloured stones, shells, the claws and teeth of wild beasts, glass beads obtained by barter, painting with ochres and vegetable dyes, wooden or bone labrets and ear-plugs, but not tattooing except amongst the Mundrucus and a few others. Cannibalism, formerly widespread, still survives here and there amongst the Amazonian and perhaps some of the hill tribes near the seaboard. Such are, or were till lately, the Botocudos of the Aimoras range, who are also noted for the enormous size of their lip and ear ornaments, round wooden discs two to three inches in diameter. The Botocudos are amongst the rudest and most primitive of all peoples, and were long regarded and treated by the white settlers rather as wild beasts than as human beings. To exterminate them recourse was even had to the artificial spread of small-pox, everything being considered lawful to get rid of such "vermin." The Botocudos have thus been cleared from the plains, but several groups still hold their ground about the head-waters of the Rio Dulce.

BORORO OF CENTRAL BRAZIL.

Cannibals also are certainly the much dreaded *Miranhas*, who roam the region between the Putumayo and

the Japura, and are recognised by their peculiar nose ornament,—two large shell buttons let into slits in the middle of the nostrils. Still more formidable are the *Mundrucus*, the *Paiguizé* or "Head-cutters" of their neighbours, who occupy a considerable domain along the south bank of the Amazon and thence inland between the Rios Madeira and Tapajos. Estimates of their number range from 15,000 or 20,000 to 40,000; but all agree that they are on the wane, which need not be regretted in the case of ferocious savages, of whom Coudreau, their last observer, declared that they knew neither right nor honourable warfare, but only "murder pure and simple." Amongst them the rank of chief (*tuchawa*) is not hereditary but obtained by personal prowess, proved by the capture of at least ten heads, which are mummified by a drying process and then worn as trophies, just as the Red Indians wore the scalps of the slain in battle. They are also amongst the tribes who kill and sometimes eat the infirm and aged, in order thus to spare them a lingering death and burial in the cold ground, or, as others report, to prevent waste of good food. But accounts differ, and some even declare that the Mundrucus are noted for their honesty, as well as for the gentle manners, brightness and vivacity of their women. In any case a more pleasant picture is presented by the *Guanas* and others of Matto Grosso, who are not only skilful boat-builders and stock-breeders but also raise excellent crops, spin, weave, and dye their cotton fabrics, and have learnt from the negroes how to treat the sugar-cane.

The Brazilian Negroes

Brazil has to thank this sugar industry, even more than its mineral wealth, for the large percentage of black

blood that has entered into the composition of her inhabitants. Their approximate numbers and distribution have already been given, and here the essential point to note is that all have been absolutely free citizens of the republic since the final extinction of slavery in 1888. As indicated by their local collective names, they came originally for the most part from the Portuguese West African possessions of *Angola* (*Nagoa* Negroes) and Upper Guinea, of which the capital was *Elmina* (*Mina* Negroes). The hot moist climate, especially of the plantation districts, suited them admirably, and, as they were on the whole treated with great humanity by their employers, they throve as a race in their new Brazilian homes. Here, for better for worse, they are permanently established, and although there is no political or social negro question in Brazil, where all enjoy complete equality, and where even racial prejudices exist only in a very mild form, there is none the less an ethnical problem now in process of slow solution. This problem, which cannot here be further discussed, may be thus formulated. How will the destiny of the land be ultimately affected by the complete fusion of the American, the African, and the European elements in the most thickly peopled if not the richest section of the republic?

It should be noticed that by the emancipation all further importation of Africans has been arrested, and that the males have from the first considerably outnumbered the females, while the defective statistics seem to show that amongst the blacks the mortality is in excess of the birth-rate. The mulattoes, however, are certainly increasing in numbers, although the pure whites tend to gain the upper hand both socially and politically.

Slavery was not abolished by a stroke of the pen, as in the British Empire, but by a gradual process in terms

of the law of September 28, 1871, which emancipated all children born in and after 1872, and enabled all others to purchase their freedom for sums varying from £90 to £110. At that time the servile class numbered about 1,610,000, and they had fallen to 600.000 in 1888, when by a special enactment all were henceforth declared free, without compensation to the owners.

These steps naturally resulted here as elsewhere in a disturbance of the social relations down to the lowest strata. The indolent freedmen, disliking work except under compulsion, at first declined all engagements, became idle loafers, and found many sentimental sympathisers to encourage and even give them a little help to play that rôle. Then these got tired and the negroes got hungry, and so things have begun to right themselves. They now readily accept employment as gardeners, day labourers, domestic servants, and especially porters in the large cities, their brawny frames being well suited for such work. At best overgrown children, with all their faults and good qualities, they are naturally loyal, and soon become attached to those employers who treat them well. But all do not treat them well, and so many leave their places, spend their earnings in dissipation, and when driven to extremities enlist in such numbers that whole battalions in the Brazilian army consist of blacks, always brave and amenable to discipline.

Others hang about the skirts of society, swell the ranks of the criminal classes, and to them has been attributed the steady increase of burglaries and other deeds of violence in all the large towns. Much injury has also been inflicted on the coffee industry in S. Paulo since the cessation of slave labour. Here were employed about 100,000 blacks, nearly all of whom at once "struck work," and returned to their old homes in the north-

eastern states. They have, however, now been largely replaced by whites on the co-operative principle, which has been introduced with some success since the abolition of the empire.

The Europeans

A sharp distinction is drawn by the whites between the *Filho do Reino* ("Son of the Kingdom"), that is, the native of Portugal, Madeira or the Azores, and the *Filho da Terra* ("Son of the Soil"), that is, the Brazilian in a pre-eminent sense, who claims to be of more or less pure Portuguese descent, is of Portuguese speech, and forms the cultured section of the population. How far the claim of racial purity is justified can no longer be determined, the estimates varying as much as from one-ninth to one-fourth.

Most of the later immigrants came, not from Portugal, but from Madeira and the Azores, and from these the early settlers are distinguished by a lighter or pale yellowish colour, shorter figures, more elegant and easy address. Careful observers have also noticed a marked difference between the Northern and the Southern Brazilians, the latter, who represent the historical Paulistas of S. Paulo, Rio Grande do Sul, and Minas Geraes, being more robust, industrious, and energetic, while also approaching nearer to the European type. It was this rude but vigorous element that made Brazil, helped to beat back the French and Dutch "interlopers," opened up the backwoods, developed the mining and plantation industries, unscrupulously and impartially raided and plundered aborigines, Jesuit Missions, and the Spaniard alike, and advanced the frontiers of the empire nearly to the foot of the Western Cordilleras.

Later, they busied themselves with internal political

affairs, more than once threatened the integrity of the State, and may yet bring about a rupture between the tropical northern and the sub-tropical and temperate southern lands. The sympathies of many, especially in Rio Grande do Sul, are with their Argentine and Uruguayan neighbours, and the tendency seems to be for all these southern populations of relatively pure Caucasic stock to gravitate together round the Plate estuary, and build up a powerful confederacy strong enough to control the destiny, not only of Brazil, but of the Latin world in South America.

Topography

A first glance at a topographical map of Brazil gives the impression that in this region there are no inland towns, none at all except on the sea-coast. The impression is so far correct that in the three vast provinces of Amazonas, Matto Grosso, and Goyaz, with an area of over 1,550,000 square miles, there is actually only one place —Manaos—which has over 10,000 inhabitants. Yet so numerous are the urban groups in the Atlantic States that Brazil, as a whole, contains more large cities, both relatively and absolutely, than any other region in the Southern Continent. No doubt some exaggeration prevails regarding their size, owing to the practice of giving the returns, not for the towns themselves, but for the townships (*Comarcas*), which often comprise extensive rural districts. But the subjoined table, in which this source of error is largely eliminated, shows that in Brazil there are over sixty places with more than 10,000 inhabitants, and as many as six with 100,000 and upwards, while according to the latest returns (1906) the federal capital is now the second largest city in South America, being outstripped only by its rival, Buenos Ayres, capital

of Argentina. It may also be noticed that the Brazilian towns, being laid out, like those of the Old World, at haphazard, or at least without much regard for symmetry, are generally far more interesting and picturesque than those of Spanish America, planned for the most part on the convenient but monotonous rectangular lines of the chess-board.

	Pop. (1906).
Rio de Janeiro	811,000
S. Paulo	332,000
Bahia (S. Salvador)	230,000
Pernambuco (Recife)	120,000
Para (Belem)	100,000
Porto Alegre	80,000
Manaos	40,000
Nictheroy	35,000
Santos	35,000
Maceio	33,000
Parahyba	32,000
S. Luiz	32,000

	Pop. (est. 1894-98).
Fortaleza (Ceara)	48,000
Natal	40,000
Pelotas	32,000
Bello Horizonte	30,000
Florianopolis (Desterro)	28,000
Caxias	25,000
Therezina	24,000
Cameta	22,000
Curitiba	21,000
Campos	20,000
Praia Grande	20,000
Aracaty	18,000
Inhauma	18,000
Rio Bonito	18,000
Itaborahy	18,000
Amarante	17,000
Braganza	17,000
Breves	17,000
Santarem	16,000
Campo Grande	16,000

	Pop. (est. 1894-98).
Jacarepagua	16,000
Santa Anna	16,000
Campinas	16,000
Taubate	16,000
Ouro Preto	16,000
Alcantara	15,000
Bom-Fim	15,000
Sorocaba	15,000
S. Fidelis	14,000
Aracaju	14,000
Diamantina	13,000
Guaratiba	13,000
Iraja	13,000
Maragojipe	13,000
Paranahiba	12,000
Petropolis	12,000
Maranguape	12,000
Estancia	12,000
Alagoinhas	12,000
Obidos	12,000
S. Domingos	12,000
Alegrete	12,000
Sobral	11,000
Cachoeira	11,000
Uberaba	11,000
Nazareth	11,000
Lorena	11,000
Ipu	11,000
Parahybana	11,000
Piracicaba	11,000
Castro	10,000
Iguape	10,000
Victoria	10,000
Cuyaba	8,000
Goyaz	3,000

Manaos, capital of Amazonas, stands on a little eminence on the left bank of the Rio Negro 10 miles above its confluence with the main stream. *Barra do Rio Negro,* as it was formerly called, takes its present name from a now extinct Indian tribe, which was at one time the head of a powerful confederacy at first hostile but afterwards well disposed towards the Portuguese. In those days the Paolistas and their Indian allies had extended their raiding expeditions to the Upper Amazon waters, and had here erected a strong outpost to protect their base of operations, and keep up the communications with the planters of the Lower Amazon districts, to whom they sold the kidnapped natives. Such was the origin of Manaos, which is now a thriving riverside port, where rubber and other local produce is brought from far and wide for export to Europe, and whence all kinds of manufactured goods are distributed to the surrounding populations. Here are settled a number of English traders and speculators engaged in developing the natural resources of Amazonia, which already enjoys the benefit of direct trading relations with the outer world. Lying at the converging point of the great waterways—Upper and Lower Amazon, Rio Negro, and Madeira—Manaos is the necessary emporium for the exchanges of the interior, and is consequently one of those favoured places for which a great future is anticipated.

But if Manaos may thus become the future "Queen of the Amazon," this title has already been earned by the great city of *Belem,* better known as *Para,* from the vast province of that name of which it is the capital. Founded in 1615 on the *Guajara* inlet of the Para estuary, Para was little heard of till the middle of the nineteenth century, when, after being nearly ruined by civil strife and epidemics, it entered on a career of sur-

prising prosperity, and has now direct commercial relations with half the world.

All visitors speak highly of its pleasant surroundings, and of its unrivalled position on the right bank of the great estuary which communicates directly with the rich Tocantins basin, and has hitherto attracted all the shipping of the Amazon itself. As long as the northern island-studded branch of the main stream continues to be neglected nothing can threaten the supremacy of Para, whose yearly exports—chiefly rubber and colonial produce, now average about £4,000,000. Another indication of its rapid expansion is afforded by the growth of the population, which, after falling from 25,000 to 15,000 during the so-called *Cabanagem* social war (1835-48), and to about 5000 after the terrible outbreak of yellow fever in 1850, again rose to over 100,000 in 1890, and is now (1908) estimated at 120,000. Although somewhat endangered by shifting banks and reefs, the channel is navigable from its mouth to Para, a distance of 60 miles, and thence all the way to Manaos for large sea-going steamers.

"The city of Para has not much to boast of in architecture; nevertheless from the river it has an imposing appearance, from the number of its churches. The convent of San Merced, and the president's palace, amongst old buildings, and the new theatre, a very elegant structure, are all worthy of notice. The streets are mostly broad and well-paved, and kept decently clean. Excellent hired carriages ply for the accommodation of the richer city merchants, while a tramway, worked by a locomotive, takes the humbler individual out to the cooler districts of *Nazareth*, a very pretty suburb with many elegant villa residences."[1] Several of the

[1] Mathews, p. 5.

thoroughfares are lined with fine palm-trees, there is a large botanical garden, and a favourable impression is produced by the unusually large number of scientific, literary, and charitable institutions.

S. Luiz de Maranhão, capital of the State of Maranhão, occupies a picturesque position on the wooded slopes of the island of like name, where it was founded in 1594 by the French adventurer, Jacques Briffault, and by his successor, La Revardière, named S. Louis in honour of Louis XIII., in 1610. This name has been retained by the Portuguese, although the French intruders were expelled in 1615. The island is partly separated from the mainland by the almost land-locked harbour of *S. Marcos Bay*, the entrance to which is commanded on the south side by the capital, and on the north by the seaport of *Alcantara*. Both places do a brisk export trade in coffee, hides, and sugar; but the bay is slowly silting up owing to the sediment brought down by the coast-streams converging at this point.

Although destitute of any natural haven, *Fortaleza*, capital of Ceara, is a larger place than S. Luiz. It lies on an open roadstead at the mouth of the little Rio Ceara, where the anchorage is good, and large vessels find a little shelter from the south winds. It takes its name from the "fortlet," which was here founded early in the seventeenth century, both to keep the Tapuya Indians in awe, and to prevent the Dutch from obtaining a footing on this part of the coast. The city is well-laid out with broad well-paved and well-lighted streets, generally planted with trees.

Therezina, capital of Piauhy, stands on the right bank of the Paranahiba do Norte. Although dating only from the year 1852, when the seat of the local administration was removed thither from the old his-

torical city of *Oeiras*, it is already the largest place in the State, its prosperity being largely due to its salubrious position some miles above the low-lying and somewhat malarious district about the mouth of the river. Here is the little seaport of *Paranahiba*, which serves as the outlet for the cattle, hides, and other produce of this agricultural province.

A much larger and more important place is *Natal*, capital of Rio Grande do Norte, which stands a few miles south of Cape S. Roque, and is consequently the nearest Brazilian seaport to the Old World. Natal occupies a sheltered position on the right bank of the Rio Grande estuary, which, however, is obstructed by a shallow bar and shifting sand-banks. A somewhat similar position is held by *Parahiba*, which lies at the head of the much larger Parahiba estuary, and is capital of the State named from this river. Here also the approaches are endangered by several reefs and sand-banks, so that all these northern seaports are avoided by vessels of heavy draught.

To this cause is largely due the great expansion of *Recife de Pernambuco*, or simply *Pernambuco*, capital of the State of that name, which although far from a good harbour, is at least the first south of Cape S. Roque accessible to ships drawing over 16 feet of water. Recife (The "Reef"), which has remained the official name, has reference to the rocky island where, according to some authorities, the first settlement was formed in 1504, soon after the discovery. This island lies just inside a long fringing reef which here encloses a considerable expanse of deep water communicating with the open sea through two or three navigable passages, and also containing the larger island or peninsula of *Antonio Vaz*. Both of these islands have long been covered with

buildings, and are connected by several bridges or causeways with each other, with *Bõa Vista* on the opposite mainland, and by carriage roads with the former capital, *Olinda*, which occupies an eminence three or four miles farther north. All these quarters are now comprised within the municipal district, through which wind the channels of the two coast-streams, *Capibaribe* and *Beberibe*, here converging from the south and north.

STREET IN PERNAMBUCO.

Pernambuco, with its separate urban groups, thus presents on a small scale a position somewhat analogous to New York and its cluster of detached quarters, with the important difference that, instead of a spacious bay, there is nothing beyond the barrier reef except an exposed roadstead with bad anchorage. Hence the port is already overcrowded, and Pernambuco cannot hope to compete much longer with its southern rival, Bahia, unless one or other of the schemes be carried out which

have been projected to improve and enlarge the harbour. Meanwhile the yearly shipping, including several lines of Atlantic steamers, already exceeds 1,000,000 tons, and the imports and exports (sugar, cotton, and all kinds of forest and colonial produce) average about £8,000,000. The State of Pernambuco is a chief centre of the cane-sugar industry, and in 1906 over 85,000 tons, valued at £605,000, were exported, despite the competition of the bounty-fed beet-root sugar in Europe.

The capital is also an important centre of intellectual life, and amongst its numerous scientific and literary institutions are the geological and geographical societies and several technical and other educational establishments. Some of the buildings, or parts of them, date from the time of the Dutch, who seized Recife in 1630, and held the place with singular tenacity till finally expelled in 1654. The present quarter of *S. Antonio*, at the north end of Antonio Vaz, was long known as *Mauricea* (*Mauritsstad*), so named in honour of Maurice of Nassau.

South of Pernambuco follow, at nearly equal distances, the flourishing seaport of *Maceio*, present capital of Alagoas, on Alagoas Bay; *Aracaju*, since 1855 capital of Sergipe, on the right bank of the Rio Cotinguiba, six or seven miles from the coast; and *Bahia*, capital of the State of like name, on the *Bahia de Todos os Santos* ("All Hallows Bay"), the most spacious, if not the finest, inlet on the east side of the Southern Continent. Bahia, or, to give it its full official title, *S. Salvador da Bahia de Todos os Santos*, was long the political, as it still is the ecclesiastical, capital of Brazil. The first settlement, said to have been founded by Diogo Alvares as early as 1510, appears to have been of a temporary character, and the regular colony dates only from 1549, when

Thomé de Souza settled his followers on the inner slope of the bold headland which projects southwards along the east side of the bay. The harbour is thus sheltered from the east and south-east winds, but not from the heavy Atlantic waves, which roll in through the narrow entrance to the bay, and at times endangers the shipping riding at anchor in deep water close in-shore.

STREET IN BAHIA.

Bahia comprises two distinct quarters—the lower town at sea-level, and the upper town, which occupies the crest of the headland, and is reached by a hydraulic lift. As the headland, nearly 200 feet high, is the most elevated ground in the whole basin, a superb panoramic view is commanded by the upper town of the great inland sea and its richly wooded shores. The waters of this magnificent inlet are of an emerald green colour, while the clear blue sky heightens the effect of light and

shade produced by the dazzling white houses and the tropical vegetation. But the prospect is tame compared with that presented by the island-studded and hill-encircled bay of Rio de Janeiro. As the metropolis of the Brazilian church, Bahia is noted for the unusual number of its ecclesiastical edifices, mostly in the somewhat monotonous style peculiar to the Jesuits. The upper town, however, is adorned by several fine structures, such as the Archbishop's Palace, the City Hall, the Theatre, Museum, Library, Hospitals, Medical High School, Treasury, and other Government buildings. Visitors are attracted especially by the beautiful *Passeio Publico*, municipal grounds containing a collection of Brazilian animals and a marble pyramid, which commemorates the throwing open of the Brazilian seaports to the trade of the world in 1808. Bahia, after being nearly ruined by the abolition of the slave trade, has benefited almost more than any other by this enlightened policy. Nearly 300,000 bags of coffee were here shipped in 1898, and for many years the total exports and imports have averaged about £4,000,000, while in 1906 the shipping exceeded 1,228,000 tons.

Tramways, here called "Bonds," radiate in various directions, giving easy access to *Itapagipe, Barra, Rio Vermelho,* and other pleasant suburban districts. But there are two serious drawbacks—the large percentage of negroes, who are more in evidence in the streets than the whites, and the climate, which, owing to the excessive heat and moisture, is very trying to Europeans. Yellow fever committed great ravages in 1849, and was followed in 1855-56 by a terrible outbreak of cholera. But these epidemics, which seem to have spent their virulence, are now less dreaded than the *carneiradas*, that

is, the endemic agues in all the low-lying tracts subject to periodical inundations.

Victoria, capital of Espirito Santo, is pleasantly situated at the head of the little bay which gives its name to the State. With Victoria properly begins the zone of present European colonisation, and since the completion of the harbour-works giving access to sea-going vessels, great numbers of immigrants—Germans, Swiss, Poles, and especially Italians—are here landed every year. The port is indicated at a distance by the conspicuous *Mestialve, i.e. Mestre Alvarez,* a three-peaked hill over 3000 feet high, which is one of the few heights in Brazil supposed to be of igneous origin. It is described by one observer as an extinct volcano still containing sulphur beds.

Beyond Victoria follows the magnificent inlet which gives its name both to the federal capital and to the State of *Rio de Janeiro.* Facing this great city at the entrance of the bay is the old settlement of the Tamoyo Indians, *Nictheroy,* properly *Nitheróhi.* First sighted by de Solis in 1515, and again visited by Magellan in 1519, the *Nictheroy,* or "Hidden Water," as it was called by the Tamoyo natives, remained almost forgotten till the year 1531 or 1532, when it was surveyed by Affonso de Souza. Supposing, from its secluded character, that it was the mouth of some great river, this navigator gave it the name of *Rio de Janeiro,* the "January River," in reference to the first day of the new year when he entered the inlet. It is noteworthy that the Indian as well as the Portuguese name still survives, Nictheroy, which stands on the right side of the entrance, over against the federal capital, being itself a large town, and since 1835 capital of the State of Rio de Janeiro.

The many picturesque and varied beauties of the

RIO DE JANEIRO.

famous bay never fail to take the stranger by surprise. A series of fantastic hills on the left of the entrance especially attracts universal attention. Owing to their striking resemblance to the outstretched human figure, they have been collectively christened "The Stone Man," of which the famous "Sugar-loaf" hill forms the feet, and the often-described "Gavia" the face in profile. The bay itself presents one of the grandest prospects it is possible to imagine. Huge granitic piles, assuming the most eccentric outlines, present steep slopes which rise sheer above the surface and take on either side of the entrance the aspect of natural fortresses. Within the vast oval basin, some 30 miles long by 20 broad, the horizon is everywhere bounded by the magnificent ranges of the Serras de Vinoa, de Tingua, da Estrella, dos Orgãos, do Morro Queimado, and others.

This little landlocked sea, the receptacle of numerous rivers, streams, and torrents rushing down from the surrounding hills, is studded with many islands and rocky crags, amongst which the most noteworthy is *Villegagnon*, with its fort of the same name. At the foot of the Sugar-loaf are the batteries of *S. Theodosio*, on a projection of the land opposite the fort of *Santa Cruz*, with the little fortified island *da Lagem* between the two. Farther on is the *Ilha das Cobras*, on which are situated many of the country seats of the Brazilian gentry. On the western shore to the left are the suburbs of *Botafogo*, north of the *Morro do Flamingo* headland, and still farther to the north the little shrine of *Nossa Senhora da Gloria*, all combining to form one magnificent picture. The eastern shore develops at the entrance a deep *saceo* or bight flanked by a projection of the land; the *Punta da Nossa Senhora da Bõa Viagem* to the south, surmounted by a chapel; and the *Punta do Calabouço* on the north.

The city lies on the western shore of the bay. Its oldest quarter, dating from about the middle of the sixteenth century, occupies an irregular plain between two series of detached rocky hills, the southern series ending with the Punta do Calabouço crowned by the castle of S. Sebastian, and the northern terminating with the Morro

RIO HARBOUR.

Bento. Between these two points are the landing-places, the quays, and the old Imperial Palace. A couple of miles beyond the suburb of *Mata Porcos* is the castle of S. Cristovão. Like most other Brazilian towns, Rio could till lately boast of but few fine buildings, the cathedral and several convents being more remarkable for size than beauty. But in recent years the city has been adorned by several fine structures, conspicuous amongst which are

SKETCH MAP OF

THE BAY AND ENVIRONS OF RIO DE JANEIRO

Chief Railways ▬▬▬ Minor Railways ▬▬▬
Railways in construction or projected ═══

ENGLISH MILES 0 5 10 15 20

the Alfandega (Custom-House), the Treasury, the School of Fine Arts, the City Hall, Post Office, Polytechnic, Board of Agriculture, Opera, and several Theatres. Rio is one of the chief outlets for the produce of the southern plantations, and in 1906 over 4,600,000 bags of coffee were shipped at this port. In the same year the total tonnage of vessels entered and cleared exceeded 2,918,000 tons. Amongst the local industries are several woollen factories and flour-mills, some of which are capable of treating from 40,000 to 60,000 tons of wheat annually. But the place still suffers from defective sanitary arrangements, and although outbreaks of yellow fever and other epidemics are less frequent than formerly, the death-rate continues to be abnormally high, and Rio cannot yet be classed with those Brazilian cities which enjoy the reputation of being fairly healthy.

Its surroundings, however, are extremely romantic, their beauty being much enhanced by the luxuriant vegetation of these tropical regions—the long silky-green leaf-blades of the banana tree, the variety of graceful palms, and the endless diversity of strange foliage and flowers. Of the primeval forest that once covered the hills and slopes only a few clumps of the larger trees have been preserved in the vicinity of the city. But the landscape is still enlivened by the famous Tijuca Cascade, which is formed by a torrent rising on the highest crest of the Tijuca cliffs, and rushing over a rocky precipice 50 feet high. Some years ago an Act was passed forbidding the further destruction of the forest trees on the hill tops in the belief that the rainfall in the neighbourhood of the city was decreasing by the rapid clearing of the land. Thus the crests and slopes of the magnificent ranges in the rear of the bay have been preserved in something like their pristine luxuriance.

From Rio a short railway with extremely steep gradients leads to the old German settlement of *Petropolis*, which stands on the slopes of the Organs range, 2634 feet above sea-level, and was the former summer residence of the Imperial family. A superb prospect is here enjoyed of the distant bay and of the lovely wooded heights in the middle distance, diversified with foaming torrents, cataracts, and waterfalls, grottos, crags of every conceivable form, and magnificent trees of the richest foliage and a thousand exquisite shapes.

In the great mining State of Minas Geraes the seat of the provincial government was removed in 1894 from the old historical capital, *Ouro Preto*, at the foot of Itacolumi, to *Minas*, or *Bello Horizonte*, which is now connected by a branch 9 miles long with the Central Railway. Since the change the population of Ouro Preto ("Black Gold," so called from the dark colour of the neighbouring auriferous rocks) has fallen from 26,000 to about 14,000, while that of Bello Horizonte, till then mere waste land, has risen from zero to 30,000 in 1899. "A plentiful water supply has been brought from the neighbouring mountains, broad streets and a public garden have been laid out, and the whole town is admirably lighted by electricity."[1] The climate is excellent, and drier than that of Ouro Preto, which had the disadvantage of being built on several hills where there was no room for expansion.

Nevertheless the transfer, which cost the State Government about £1,000,000, is regretted by many, who in the new "mushroom city" miss the picturesque situation and the quaint old buildings, as well as the crowded historical associations of the old capital. Moreover, Ouro Preto stands in one of the richest mineral districts

[1] H. D. Beaumont, *Consular Report*, February 1899.

in the world, the resources of which are still far from exhausted. "In the very streets of the town gold is still found in small quantities after heavy rain" (*ib.*): from the neighbouring *Gongo Secco* Mine an English Company has extracted over £1,000,000, while at no great distance there are mountains of almost pure iron still untouched. Farther north gold occurs associated with diamonds, as indicated by the very name of the old city of *Diamantina* on the western slope of Itambe. Here diamonds were first discovered in 1725, although a band of Paolistas had already founded the station under the name of *Tijuco* before the close of the seventeenth century. From the same locality came the famous Portugal crown diamond, the value and even true character of which have never been ascertained.[1] Between 1772 and 1843, the period of greatest activity, the total yield was 1,355,000 carats, worth about £2,500,000, irrespective of the contraband trade carried on in colonial times. But the auriferous ores are generally of a low grade, and the Santa Anna lode, worked continuously since 1884, has yielded gold valued at only £252 (*Consular Report*, July 1908).

South of Minas Geraes plantations take the place of the mining industries, and *S. Paulo*, capital of the great coffee-growing State of like name, ranks already as the second city in Brazil for population, and perhaps the first for the public spirit and enterprise of its inhabitants. It lies not far from the coast on the inland slope of the Serra do Mar, about the headwaters of the Rio Tieté, which flows west to the Parana, and is connected by a short railway with its seaport of *Santos*.

[1] The "Braganza," as this stone has been christened, weighs 1680 carats, and if genuine would be worth £60,000,000, but is by many supposed to be a white topaz (Streeter, *Precious Stones and Gems*).

S. Paulo is one of the oldest places in Brazil, the convent of the Jesuits, now transformed to a High School, dating from the year 1552. Yet it has a strangely modern aspect with its long and busy thoroughfares lined with handsome shops and warehouses, and lit by electricity, its tramways and railways radiating in all directions, its fine suburban quarters, and many imposing public buildings, such as the Government Offices, the Cathedral and Episcopal Palace, the Treasury, the Legislative Chambers, and especially the really magnificent Palace of Ypiranga, erected to commemorate the Declaration of Independence. Thanks to its elevated position on the plateau (2460 ft.) its relatively high latitude, good water, and improved sanitary arrangements, S. Paulo is both a pleasant and a healthy residence, where the large European section of its inhabitants have found new and congenial homes amid surroundings not greatly dissimilar from those of the old country. Extensive drainage and other works have also recently been undertaken to improve the climate of Santos, and relieve it from the reproach of being one of the worst fever dens in the New World. In 1898 as much as 5,630,000 bags of coffee were shipped at this place, while the total annual exchanges now average £15,000,000.

Agricultural interests, including stock-breeding, are also dominant in the three other southern states of Parana, with its capital *Curitiba*, which, like S. Paulo, lies on the landward slope of the Coast Range; Santa Catharina, whose capital, *Desterro*, on the island of Santa Catharina, has recently been re-named *Florianopolis;* and Rio Grande do Sul, whose capital, *Porto Alegre*, was founded in 1742 by some Portuguese from the Azores at the head of the *Guahiba* estuary, converging point of all the land and water highways. *Rio Grande*, former

capital of this state, stands on the Rio Grande emissary of the Laguna dos Patos, not far from the Uruguay frontier; but it cannot reap the full benefit of this advantageous position until the harbour works are executed, by which it is proposed to improve its seaward approaches. Meanwhile it is somewhat eclipsed both by Porto Alegre and by Desterro, which latter is accessible to vessels drawing 14 or 16 feet of water, and is also much more pleasantly situated on an island noted for its excellent climate.

Goyaz, capital of the State of like name, and *Cuyaba*, present capital of Matto Grosso, await the development of the interior to become even good-sized towns. Goyaz was founded, without any regard for its future prospects, but only as a mining station, in an auriferous district on the Rio Vermelho in the Upper Araguaya basin. The climate, however, is good, and if little gold and few diamonds are now found in the neighbourhood, the district grows a good wine, and an excellent tobacco, the *fumo picado*, which commands the first price in Brazil, and is vaunted by the natives as the finest in the world.

Cuyaba occupies an important position near the head of the Cuyaba affluent of the Paraguay, and consequently close to the low divide between that river and the Amazon basin. Like Goyaz, it was originally a mining station, and is also favoured with an excellent climate. To this circumstance Cuyaba owes the distinction of having been chosen in 1820 as the seat of the provincial government instead of the old capital *Villa Bella*, called also *Matto Grosso*, which was founded in 1752 in a fever-stricken mineral district on the Upper Guaporé.

Natural Resources—Mining Industry

In Brazil mining operations have long ceased to be of much economic importance, and although manufactures have in recent years been greatly stimulated by the high protective duties levied on foreign wares in the interest of the local industries, the country still derives most of its wealth from the land and water—forest produce, plantations, small farming, stock-breeding, and fisheries.

The formerly productive gold-mines of Rio de Janeiro and S. Paulo have been mostly abandoned, while those of Goyaz are worked only by a few private persons or small associations without capital or modern appliances. Gold also occurs in many other districts, such as Matto Grosso, Maranhão, Piauhy, Parana, Santa Catharina, and Rio Grande do Sul, but is nowhere systematically mined except in Minas Geraes, from which is obtained nearly all the precious metal still exported. Between 1780 and 1908 Minas Geraes yielded £80,000,000, and the whole of Brazil about £146,000,000; but the present annual yield scarcely exceeds £200,000. Of the six mines at work in Minas Geraes five belong to English companies. The production of diamonds (see above) has also greatly fallen off since the discovery of these gems in South Africa. It fell for the whole of Brazil from a quantity valued at £300,000 in 1867 to £70,000 in 1906. Associated with diamonds are several other precious stones, such as topazes, garnets, amethysts, and beryls, but not emeralds, those formerly reputed as such being a variety of tourmaline.

No serious attempt has yet been made to utilise the rich deposits of the more useful metals—copper in Rio Grande do Sul, lead and especially iron in Minas Geraes, magnetite in Parana and Santa Catharina. In the latter

State and in Rio Grande do Sul there appear to be extensive reservoirs of petroleum, which has recently been tapped at one or two points.

Agricultural Prospects—Coffee Culture

The former exaggerated notions regarding the "boundless vegetable resources" of Brazil have been somewhat modified, since it has been shown that most of the campos, that is to say, about two-thirds of the whole land, are scarcely arable, and in any case of little use for agriculture. It has also been pointed out that Brazil lacks the two fertilising elements of the earth-worm, which is ceaselessly ploughing up and enriching the soil, and of a winter season during which the land "sleeps and is refreshed." In the dry months from June to September the upland campos show vast spaces "covered with a sparse vegetation, dried up and parched, the boughs and branches all bare and leafless, and the soil baking in the dry heat; then the fallen leaves, dried hard and crisp, are scattered and broken by the wind, and their elements dissolve into gasses. It is only in the thick forests, where the soil is naturally damp and moist, that these sources of fertility are allowed to collect and enrich the ground" (Wells, vol. ii. p. 356).

Nevertheless, there still remain immense areas of fertile lands, which only await settlers and development to supply half the globe with all kinds of valuable commodities. These lands are, moreover, conveniently situated on the Atlantic seaboard, that is, in the region 300 or 400 miles broad which lies between the Amazon and Plate estuaries, and comprises nearly a million square miles, enjoying easy access to the outer world. Thanks partly to the large percentage of freedmen, since the

emancipation no longer bound to work, and partly to the enervating effect of the climate on the descendants of the vigorous early colonists, the old settlements in the north have remained somewhat stationary, or even lost ground, at least in the interior, as is also the case in the mining districts of Goyaz and Matto Grosso. But in the south the inflow of immigrants from Europe has given an extraordinary impulse to agricultural pursuits, as shown by the mere fact that more than half of the world's yield of coffee is now raised in S. Paulo and some of the neighbouring States. Introduced from Guiana early in the eighteenth century, coffee culture made little progress till about 1840, when the yearly crop exceeded 60,000 tons. Since then it has steadily increased to 838,000 tons in 1906, when the quantity exported was valued at £27,656,000.

Formerly Brazil also took the first place for the production of cane-sugar; but at present the plantations, mainly confined to Pernambuco and Rio de Janeiro, seldom yield more than about 200,000 tons, and of this a large proportion is used for the distillation of *cachaca*, an inferior kind of rum. In 1906 about 85,000 tons of sugar, valued at £606,000, were exported.

The cultivation of cotton, which is grown especially in Ceara and neighbouring states, received a great impulse during the American War of Secession. Since then it has been revived by the almost prohibitive duties levied on foreign cotton goods, and there are at present as many as 155 cotton-mills kept going by the local yield. Cotton spinning and weaving, mostly confined to the Southern States, is, at present, the most flourishing manufacturing industry, employing (1899) as many as 200,000 hands, and producing plain but substantial unsized textiles to the yearly value of over £3,500,000.

Tobacco, of uniformly fine quality, is grown chiefly in Bahia and Goyaz, where the yearly crop averages 50,000 tons, and in 1906 the exports were valued at £920,000. Of cacao, also of prime quality, the annual yield exceeds 6000 tons; but the tea plant, which thrives well on the S. Paulo plateau, is neglected for maté, of which 58,000 tons were exported in 1906.

Of strictly alimentary plants, raised mainly for local consumption and cultivated in a somewhat primitive way by the small farmers, the most important are rice, manioc, black beans, maize, potatoes, and yams. The first three are essential constituents of the national dish, *feijoada*, to which is usually added *carne secca*, or charqui, of which there are two kinds, one from Argentina or Rio Grande do Sul, the other, of finer quality, from the Obidos district, Amazonia. Of fruits, all generally of excellent flavour, the most widely diffused are bananas of two kinds, figs, and oranges, these last growing almost wild, as in Paraguay.

Stock-Breeding—Forest Produce

Despite the vast extent of the grassy campos, stock-breeding is relatively little developed, except in Rio Grande do Sul. In the central provinces there are two distinct breeds of cattle, which might be called "short-horns" and "long-horns," some of the latter (in Minas Geraes) with magnificent horns 5 and even 6 feet from tip to tip. Both have been crossed with stock from Jersey, and with the Indian zebu. Horses are generally of inferior blood, and there are no ponies comparable to the sturdy, docile, and sure-footed little Chilean breed.

Reference has already been made to the endless variety of natural products yielded by the Amazonian forests.

These certainly constitute a permanent source of the national wealth, and rubber especially now forms a chief item in the table of yearly exports—£5,905,000 to Great Britain alone in 1906. Thanks to the development of steam navigation on the Amazon and its tributaries, this industry has made rapid progress since 1840, when the annual yield scarcely averaged 400 tons. In 1896 it exceeded 24,000 tons, while the total yield in 1906 was estimated at nearly £13,000,000.

Railway Enterprise—Trade

But, for their full expansion all these industries still await improved communications, and especially the execution of several railway projects, which have been planned either to supersede the wretched routes, often mere tracks or bridle-paths across the plateaux, or else to turn the cataracts barring access to the upper reaches of such great navigable arteries as the Madeira, the Rio Negro or the S. Francisco. Some of these projects, which have been prepared by competent engineers and are perfectly practicable, aim not merely at opening up the Brazilian backwoods, but at giving the Andean States, especially Peru and Bolivia, direct and easy access to the European markets. They are thus of international concern, and when carried out must make the Amazon one of the great commercial highways of the world, while conferring on Brazil itself a position of unrivalled importance as the intermediary of the exchanges between both sides of the Atlantic Ocean.

Brazil, however, is now steadily developing a continuous railway system, and since the completion of the first line from Rio to Petropolis in 1856 over 10,400 miles have been opened for traffic, while about 400 miles

were under construction in 1906. But these lines, owned some by the State, some by private companies, have not been constructed on a uniform plan, or even with a uniform gauge. There are, however, two considerable provincial networks, one radiating from Rio and penetrating into Minas Geraes, the other starting from Santos, and these are now connected by a line 370 miles long, which runs up the valley of the Parahiba do Sul and crosses the water-parting down to S. Paulo in the Parana basin. Elsewhere there are only a few isolated lines, or else little detached systems, such as those branching in several directions from Pernambuco, or ramifying round Bahia Bay. There is, however, some prospect of a transcontinental trunk line being soon undertaken to connect the Brazilian coast systems with those of the Pacific seaboard over the Andes.

Meanwhile a general increase of wealth and material prosperity is attested by the annual trade returns, which, despite heavy protective duties on imported wares, amounting in some instances to 80, 100, and even 120 per cent, show a steady increase from year to year. Thus the total imports rose from about £7,000,000 in 1885 to over £33,200,000 in 1906, and the exports from £8,000,000 to £53,000,000 in the same period. In the latter year the British imports exceeded £7,643,000, and the exports to Great Britain £9,112,000. The chief items of export are coffee, rubber, tobacco, hides, and cocoa, the two first being very much more than all the rest together.

Government—Education—Finance—Armaments

The present constitution, in virtue of which the "Brazilian Empire" became the "United States of

Brazil" (see p. 486), was adopted by the National Congress in February 1891. It provides for a legislative assembly, consisting of a Senate and Chamber of Deputies, both paid and both chosen by direct vote, the Senators for nine years, one-third retiring by rotation every three years, the Deputies for three years in the proportion of one to every 70,000 of the population, as shown by each recurrent decennial census, but so that each State shall have at least four representatives. By this arrangement the Lower House comprises at present (1908) 212 members, while the Senators are permanently fixed at 63, that is to say, three for each State and for the Federal district. The States themselves, which correspond in name and extent with the old historical provinces, are virtually so many autonomous republics, enjoying all the privileges of self-government which do not clash with those of the Commonwealth. Thus they have each its own Congress of two houses, which manages all local affairs without interference from the Federal Government, except for defence, maintenance of order, the execution of the Federal laws and fiscal arrangements in such matters as import duties, stamps, rates of postage, and bank-note circulation. Even the export duties are controlled by the provincial parliaments, and applied to local administrative purposes.

The executive functions are entrusted to a President, who must be a native of Brazil and over thirty-five years of age, and is elected with a Vice-President for four years by direct popular vote. He is not re-eligible for the next ensuing term, but enjoys extensive powers, including the appointment and dismissal of the six ministers or Secretaries of State (War, Navy, Foreign Affairs, Finance, Justice with Public Instruction, and Industry with Board of Works), the supreme command

of the army and navy, and (within certain limits) the right to declare war and make peace.

The franchise is practically universal for all citizens over twenty years of age, the only exceptions being mendicants, illiterates, soldiers under the flag, and monks under vows of obedience.

Catholicism, formerly the State religion, was disestablished by the Constitution, which proclaimed the absolute freedom and equality of all forms of religion. Provision, however, is made by the State for the maintenance of the existing clergy of the Catholic Church, which comprises the whole of the settled population, except about 160,000 Protestants and 10,000 Jews and sundries.

In respect of education, which appears to be nowhere compulsory, Brazil stands at a very low level, about 84 per cent of the population being returned as absolutely unlettered. At the same time the returns under this head are extremely defective, and in many cases altogether unprocurable. Thus the central department has constantly to complain that it can get no information from the States, which partly control secondary, and have the exclusive management of primary education, limited only by the conditions required under the Constitution that primary instruction be gratuitous, and that all branches be under lay management. On the other hand the higher education is administered by the central government, which maintains two schools of medicine, four of law, four military, one naval, one of mines, and a polytechnic, besides the Lyceum of Arts and Trades, and a school of astronomy and engineering connected with the observatory at Rio.

The financial troubles of Brazil may be said to have begun with the Paraguayan war, which cost her £60,000,000. Since then the yearly Budget has

generally shown a deficit, sometimes of two or three millions. Nevertheless she has never repudiated her debts, or failed to meet her foreign engagements, and as her assets—the national resources—are great, her credit still stands high in the money markets of the world.

It would perhaps stand higher, were she to reduce her armaments, which seem to be in excess of her legitimate needs, and continue to absorb an undue proportion of the national revenues. A standing army nominally of 28,000 men, besides a gendarmerie of over 20,000, and a navy of seven ironclads, five cruisers, six monitors for coast defence, several torpedoes and gunboats, are maintained at a cost of nearly £2,000,000, while the public and State debts are approaching £200,000,000, and the yearly deficit exceeded £3,000,000 in 1907.

CHAPTER XVI

THE FALKLAND ISLANDS AND SOUTH GEORGIA

THE soundings taken by the Belgian Antarctic Expedition of 1898-99 fully confirm the results of previous surveys, tending to show that the continental plateau falls beyond Fuegia rapidly southwards in the direction of the Shetlands and Graham's Land, but is continued from South Patagonia and Staten Island by the so-called *Burdwood Bank* eastwards in the direction of the Falklands and South Georgia. Thus is confirmed, if confirmation were needed, the assumption that both of these outlying British possessions are not oceanic lands upheaved by igneous agencies, of which there are no traces, but at one time formed part either of South America or of the Austral Continent, the belief in which has been revived by recent geological and biological observation. Support is in fact lent by many circumstances to the generally accepted view that the Andean system, which now terminates abruptly at Staten Island, reappears in the FALKLAND GROUP, which in its main physical features presents a close resemblance to the Fuegian Archipelago. It consists of two large masses, the *West* and *East Falkland*, fringed by clusters of about a hundred reefs, rocks, and islets, and divided by the

narrow and shallow *Falkland Sound* into two nearly equal sections, with a total area of 6500 square miles.[1]

As in Fuegia, both of the large islands are indented by numerous fjord-like inlets, which are all disposed in the same direction from north-west to south-east, and are almost certainly of glacial origin. The ranges of low hills also have the same general trend, and are confined to the northern parts, where they attain their greatest elevation in Mount Adam 2325 feet high.

Like most marine groups, the Falklands, which lie 340 miles east of Magellan Strait, enjoy a more equable and temperate climate than might be expected from their position between 51° and 53° S. lat. The glass may for a short time fall as low as 20° or even 15° Fahr. in severe winters, but it seldom rises above 76°, the mean for the year lying between 45° and 50°. The Archipelago is, moreover, one of the healthiest places in the whole world, the birth-rate rising to 28 or 30, while the mortality scarcely exceeds 7 or 8 per thousand. But it is not a pleasant place of residence, being both damp and foggy, and exposed to high gales, which prevail at all times, and are said occasionally to blow with such violence as to uproot the very cabbages of the kitchen-gardens, and scatter them like chaff over the land. Certain it is, that despite an abundant rainfall and a suitable soil, no trees can grow in the islands, so that the vegetation is mainly herbaceous. Large tracts are covered with the so-called "tussock-grass" (*Dactylis cæspitosa*), which grows in tufts five or six feet high, and both as green fodder and as hay is unsurpassed as food for cattle, sheep, and horses. A curious natural phenomenon are the so-called "stone rivers" or "stone runs," an explanation of which is given by Mr. R.

[1] East Falkland, 3000 ; West Falkland, 2300 ; islets, 1200.

Valentin in the *Geograph. Jour.* for Jan. 1905. The settlers devote their attention chiefly to sheep-farming for the sake of the wool, which forms the staple export of the colony, and to the frozen-meat industry, for which the horned cattle supply an excellent raw material. It is noteworthy that these animals, sprung from some oxen let loose on the islands by the French navigator Bougainville, in 1764, have considerably increased in size, while the horses have, on the contrary, grown smaller. The native fauna is represented chiefly by penguins and gulls.

First sighted by Davis in 1592, and again visited in 1594 by Hawkins, who named them the "Maiden Islands,"[1] in honour of Queen Elizabeth, the Falklands received their present designation in 1689 from Strong, in compliment to his friend and patron, Lord Falkland. Then they were neglected till about the time of Bougainville's visit, when the Spaniards established a military post at a point already occupied by a few English pioneers, whom they treated in a somewhat high-handed way. This brought on the scene a squadron under Admiral Byron, who, after reinstating the dispossessed settlers, founded the station of *Egmont*, on the bay of like name. But the port was not maintained, and in 1828 Argentina, as heir to the rights of Spain, made a concession of the group to Louis Varnet, a French stock-breeder. His claims, however, were not recognised by the powers, and when he attempted to enforce them by levying taxes on some North American whalers, his settlement was destroyed by a United States man-of-war in 1831. Two years afterwards England, despite the protests of Argentina, resumed possession of the group, and chose as the

[1] This identification, however, is questioned by Commander B. M. Chambers (*Geogr. Jour.*, April 1901).

centre of administration the excellent harbour of *Port Stanley* on the east side of the eastern island. The settlers, who in 1906 numbered 2065, nearly all of British origin, have taken part in the management of local affairs since 1892, when the Falklands became a Crown colony under a Governor, assisted by an executive and a legislative council. From the subjoined comparative table of statistics for recent years, the colony, while enjoying a fair measure of prosperity, does not appear to be progressing, possibly because the exports, being exclusively agricultural,—wool, hides and skins, tallow, etc.,—necessarily fluctuate with the demands of the English markets :—

	1893.	1895.	1906.
Revenue	£11,450	£12,518	£15,822
Expenditure	11,388	13,159	15,692
Imports	71,126	71,826	66,433
Exports	134,872	122,988	185,227

Population (1891), 1798 ; (1906), 2065.
Acres under pasturage (1897), 2,325,154.
Live stock (1906) : sheep, 702,696 ; cattle, 4500 ; horses, 3000.
Shipping (1906) : 57 vessels of 137,470 tons entered.
Savings Bank deposits (1906), £52,661

South Georgia, which lies 1250 miles east of Fuegia, and has an area of 1600 square miles, is beyond all doubt a surviving fragment of some now vanished continental land. Apart from a few rocky islets, it consists of a single island disposed in the same direction from north-west to south-east as the Falkland hills and fjords, but attaining a far greater elevation. Its very old formations—gneiss and argillaceous schists, showing no traces of fossils—tower far above the snow-line, which in these high latitudes (54° to 55° S.) falls to about 2000 feet above sea-level. Some of the snowy peaks range from 6000 to 8000 feet, and their slopes are furrowed by deep gorges filled with glacial streams

which here and there descend to sea-level. The Ross glacier even sends a contingent of icebergs across Royal Bay to join the cortege of these glittering masses drifting up from the Antarctic waters. It was at Royal Bay, on the south-east side of the island, that was stationed the German expedition sent out to observe the transit of Venus in 1882. Except by such casual visitors, whalers, or explorers, South Georgia has never been occupied, having hitherto failed to attract any permanent settlers, although well suited for sheep or cattle farming, being covered with tussock-grass up to a height of about 1000 feet above the sea. But the climate is damp, foggy, and cold, snow falling at times, even in February, the warmest month in the year. From observations taken in Royal Bay, the mean temperature scarcely averages more than 34° or 35° Fahr., and seldom rises above 66°, but falls in winter as low as 9° or 10°. Yet the German naturalists were able to collect as many as thirteen flowering plants, twelve of which were common to the Falklands and Fuegia, while one belonged to the flora of distant New Zealand. Thus are daily brought to light fresh facts pointing at the former existence of an Austral continent affording perhaps nearly continuous land round a great part of the globe in late Secondary or early Tertiary times.

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